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BACK TO MORAL TREATMENT AND COMMUNITY CARE

THE PRESIDENTIAL ADDRESS DELIVERED AT THE ONE HUNDRED AND
FIFTEENTH ANNUAL MEETING HELD AT WARLINGHAM PARK HOSPITAL,
18 JULY, 1956

By

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MAY I, in the first place, thank you most sincerely for the honour you have done me by electing me as your President during the coming year. Whilst the names of my distinguished predecessors enhance this honour in my eyes, at the same time I cannot help a feeling of humility and inadequacy at the thought of attempting to follow in the footsteps of those illustrious members of our profession whose names shine ever more brightly as the march of time reveals more clearly their contribution to our specialty and to the welfare of the mentally ill.

One of my predecessors in office suggested in his Presidential Address that "It is well that we should from time to time, whilst occupied in life's pilgrimage, lean upon our staff, pause and seriously consider the position it has pleased the will of Providence that we should occupy. It is right and befitting that we should occasionally solemnly reflect upon the PAST, dwell with earnestness upon the PRESENT, and seriously ponder over the FUTURE. It is well that he who is entrusted by the legislature with the care and treatment of the insane should frequently ask himself the question—What are the functions delegated to me? Do I entertain a right appreciation of my important duties, and am I so discharging them that at the great and final day of judgment I shall be in a position to give a good and faithful account of my stewardship?" (1). These words were uttered by Dr. Forbes Winslow from the Presidential chair at the Annual General Meeting held at the Great Western Hotel, Paddington on 2 July, 1857, ninety-nine years ago.

It is indeed very right and proper, on a day like this, that we should turn our minds back to those far-sighted pioneers who helped to shape psychiatry as we know it today, to men like Dr. Samuel Hitch of Gloucester Asylum, who founded our Association, and many others who were well ahead of their time. Dr. Samuel Hitch would feel quite at home taking part in tomorrow's discussion on open doors in mental hospitals. When Dr. Crommelinck of Bruges visited Gloucester in 1841, Samuel Hitch told him—"In one respect I pride myself in having gone far beyond all other asylum doctors, and that is to the extent to

which I trust my patients; whenever possible I put them on their honour: I never refuse to take a patient's word as a pledge that he will keep a promise. Following this principle I can assure you that at least a fifth part of my patients are under no restriction whatever. On Sunday about the same proportion go to service in various churches in the neighbourhood, most of them without any escort. Often I send several patients in company and they look after each other; you will understand that I only grant this privilege to those who I am sure will appreciate it, and this appreciation is enough to make them exercise a sufficient control over their actions" (2). That was 115 years ago.

Charles Dickens in his *American Notes* published in 1842 describes what is now the Boston State Mental Hospital as follows:

"The State Hospital for the Insane is admirably conducted on those enlightened principles of conciliation and kindness, which twenty years ago would have been worse than heretical.

"Each ward in this Institution is like a long gallery or hall, with the dormitories of the patients opening from it on either side. Here they work, read, play at skittles, and other games; and when the weather does not admit of their taking exercises out of doors, pass the day together.

"Every patient in this asylum sits down to dinner every day with a knife and fork and in the midst of them sits the gentleman (the Superintendent). . . . At every meal, moral influence alone restrains the more violent among them from cutting the throats of the rest, but the effect of that influence is reduced to an absolute certainty, and is found, even as a means of restraint to say nothing of it as a means of cure, a hundred times more efficacious than all the strait waistcoats, fetters and hand-cuffs, that ignorance, prejudice and cruelty have manufactured since the creation of the world.

"In the labour department, every patient is as freely trusted with the tools of his trade as if he were a sane man. In the garden and on the farm they work with spades, rakes and hoes. For amusement they walk, run, fish, paint, read and ride out to take the air in carriages provided for the purpose. They have among themselves a sewing society to make clothes for the poor, which holds meetings, passes resolutions, never comes to fisticuffs or bowie-knives as some assemblies have been known to do elsewhere, and conducts all the proceedings with the greatest decorum. The irritability, which would otherwise be expended on their own flesh, clothes and furniture is dissipated in these pursuits. They are cheerful, tranquil and healthy.

"Once a week they have a ball, in which the Doctor and his family, and all the nurses and attendants take an active part. Dances and marches are performed alternatively, to the enlivening strains of a piano and now and then some gentleman or lady (whose proficiency has been previously ascertained) obliges the company with a song; nor does it ever degenerate, at a tender crisis, into a screech or a howl; wherein, I must confess, I should have thought the danger lay. At an early hour they all meet together for these festive purposes, at eight o'clock refreshments are served, and at nine they separate.

"Immense politeness and good breeding are observed throughout. They all take their tone from the Doctor; and he moves, a very Chesterfield, among the company.

"Like other assemblies, these entertainments afford a fruitful topic of conversation among the ladies for some days, and the gentlemen are so anxious to shine on these occasions that they have been sometimes found 'practising their steps' in private, to cut a more distinguished figure in the dance. It is obvious that one great feature of this system is the inculcation and encouragement, even among unlikely persons, of a decent self respect" (3).

Now let me take you back another 5 years to the year of Queen Victoria's accession to the throne in 1837 and listen to the words of Dr. W. A. F. Browne, later the first superintendent of the Crichton Royal Mental Hospital, and father of Sir James Crichton-Browne, addressing the Managers of the Montrose Royal Lunatic Asylum on the asylum as it ought to be:

"Conceive a spacious building resembling the palace of a peer, airy, and elevated, and elegant, surrounded by extensive and swelling grounds and gardens. The interior is filled up with galleries and workshops and music rooms. The sun and the air are allowed to enter at every window, the view of the shrubberies, and fields, and fruits of labourers is unobstructed by shutters or bars, all is clean, quiet and attractive. The inmates all seem to be attracted by the common impulse of enjoyment, all are busy, and delighted by being so. The house and all around appears a hive of industry. When you pass the lodge, it is as if you had entered the precincts of some vast emporium of manufacture; labour is divided, so that it may be easy and well performed, and so apportioned that it may suit the tastes and powers of each labourer. You meet the gardener, the common agriculturalist, the mower, the weeder, all intent on their several occupations, and loud in their merriment. The flowers are tended, and trained and watered by one, the humbler task of preparing the vegetables for table is committed to another. Some of the inhabitants act as domestic servants, some as artisans, some rise to the rank of overseers. The bakehouse, the laundry, the kitchen are all well supplied with indefatigable workers. In one part of the edifice are companies of straw-plaiters, basket makers, knitters, especially among the women, in another, weavers, tailors, saddlers and shoemakers among the men. For those who are ignorant of those gentle crafts, but are strong and steady, there are loads to carry, water to be drawn, wood to be cut, and for those who are ignorant and weakly, there is oakum to tease and yarn to wind. The curious thing is, that all are anxious to be engaged, toil incessantly, and in general without any other recompense than being kept from disagreeable thoughts and the pains of illness. They literally work in order to please themselves, and having once experienced the possibility of doing this, and of ensuing peace, self-applause and the approbation of all around, sound sleep, and it may be some small remuneration, a difficulty is found in restraining their eagerness and moderating their exertions.

"There is in this community no compulsion, no chains, no whips, no continual chastisement, simply because these are proved to be less effectual means of carrying any point than persuasion, emulation and the desire of obtaining gratification. But there are graduations of employment. You may visit rooms where there are ladies reading, or at the harp or piano in flowery muslin, or engaged in some of those thousand ornamental productions in which female taste and ingenuity are displayed. You will encounter them going to church or market, or returning from walking, riding and driving in the country. You will see them ministering at the bedside of some sick companion. Another wing contains those gentlemen who can engage in intellectual pursuits; or in the amusements and accomplishments of the station to which they belong. The Billiard Room will in all probability present an animated scene. Adjoining apartments are used as news-rooms, the politicians will be there. You will pass those who are fond of reading, drawing, music, scattered through handsome miles of rooms, furnished chastely, but beautifully, and looking down upon such fair and fertile scenes as harmonize with the tranquillity which reigns within and tend to conjure up images of beauty and serenity in the mind which are akin to helplessness. But these persons have pursuits, their time is not

wholly occupied in the agreeable trifling of conning a debate, or gaining so many points, one acts as an amanuensis, another is engaged in landscape painting, a third develops to himself a course of historical reading, and submits to examination on the subject of his studies, a fourth seeks consolation from binding the books which he does not read. In short all are so busy as to overlook, or all are so contented as to forget their misery.

"Such is a faithful picture of what may be seen in many institutions, and of what might be done in all, were asylums conducted as they ought to be" (4).

To those of us who pride ourselves, with justification, on the great improvements in mental hospitals during the last couple of decades, it is salutary to reflect that Dr. Browne uttered these words no less than 119 years ago. Although great progress has been made in clinical psychiatry since Dr. Browne's day, I am firmly of the opinion that even today the most important single factor in determining the patients' happiness and progress is sound medical administration, such as was taught over a hundred years ago. There is indeed nothing new in the concepts of the open door and the therapeutic community. These modern trends in psychiatry are, however, an indication of a return to what was best during the era of "the moral treatment of the insane".

Psychiatric treatment at any one time depends not only on current medical theories regarding the causation of mental illness, the latest product of the drug houses, or the skill of the neurosurgeon, but also on the degree of toleration to its deviants and the sympathy towards its more helpless members shown by society.

At one time it was generally accepted that insanity was the result of demoniacal possession; this being the case, the treatment was left in the hands of priests, and consisted of prayers and the rites of exorcism. When this treatment failed, or when it was suspected that the victim had, of his own free will, consorted with the forces of evil, the treatment of choice consisted of whippings.

It was not until the eighteenth century that mental illness came to be regarded as a disease to be treated by a medical practitioner rather than by a priest. This followed great advances in the study of the anatomy and physiology of the brain and the occasional discovery of atrophy or of tumours of the brain at post-mortem examinations. These discoveries were of doubtful benefit from the patients' point of view, for when the doctors took over, they added emetics, blisterings, bleedings and purges to the list of treatments, without entirely doing away with the whippings.

Towards the end of the century greater attention was paid to social and environmental factors in the causation of mental illness, and it was found that organic changes in the brain were rather rare at post-mortem examinations. The insane came to be regarded as normal people who had lost their reason as a result of having been exposed to severe psychological and social stresses. These stresses were called the moral causes of insanity, and moral treatment aimed at relieving the patient by friendly association, internal discussion of his difficulties and the daily pursuit of purposeful activity; in other words, social therapy, individual therapy and occupational therapy.

Moral treatment reached its zenith in the years between 1820 and 1860. The results of treatment during that period were outstandingly good and bear comparison with some of the figures obtainable today. For example, in all patients admitted to the York Retreat within 3 months of the onset of illness—between the years 1796 and 1861, the discharge rate was 71·117 (5). Similar results were obtained in the Worcester State Hospital, U.S.A., where 70 per cent. of all those admitted within one year of the onset of their illness were

discharged during the years 1833–1846. These patients were followed up until 1893, and it was ascertained that one-half of the original number had experienced no recurrences (6). These are truly remarkable figures, especially when one takes into consideration that a substantial portion of the patients must have been general paralytics, for which there was at that time no effective treatment.

It is generally agreed that the use of moral treatment declined during the latter half of the nineteenth century and that it probably reached its lowest level during the first and second decades of the present century. No satisfactory explanation has been offered for this. Some have attributed it to the increasing size of the asylums which rendered it impossible for the physician to keep in touch with his patients. He moved further and further away from his patients, leaving them largely in the care of untrained staff. John Conolly in his Presidential Address to this Association 98 years ago, commented on the dangers of enlarging the existing asylums in the following terms:

“But I would particularly request your serious attention to the enormities, I deeply regret to have to say, committed by the Visiting Magistrates of the County of Middlesex, who are enlarging their already far too large asylums, adding wing to wing, and storey to storey, and thus constantly accumulating impediments to any proper system being pursued in them. The works now in progress will make efficient inspection impossible, and leave the patient exposed to violences and accidents, which in turn will become the pretexts for the renewal of strait waistcoats, and straps and chairs, and gags, and all the horrors of times thought to have gone by. The mere accumulation of people contemplated in these buildings, who are to be crowded together from underground basement to roof, will be disgraceful to England in this age, even in a sanitary point of view. In some cases twelve or fifteen hundred lunatic patients, all more or less disorderly in bodily health, are to be placed in one building” (7). Conolly went on to say that the errors of building such large institutions were pointed out to the magistrates by the Commissioners in Lunacy, but their objections were overruled in the interests of economy.

This was in 1858. By 1870 we find from the Commissioners' Reports that the strait jacket and other means of mechanical restraint had already returned to Hanwell; the strait jacket, which Conolly had striven so hard to abolish in 1838. Across the Atlantic one Medical Superintendent resigned at the thought of his mental hospital being enlarged from 400 to 600 beds. The overall discharge rate at the Worcester State Hospital declined from 50 per cent. in 1830 to 5 per cent. in 1880. The efficacy of mass production methods and the need for economy appear to have blinded the eyes of the legislators to basic needs. Others have attributed the decline in moral treatment to the growing materialism of the period, the influence of Darwin and the cellular pathology of Virchow.

The idea that insanity was inherited and due to irreversible cellular changes which could be shown under the microscope led to a feeling of hopelessness among the clinicians of the period, who appear to have been impressed by the spirit of therapeutic nihilism. The interests of society were best secured by segregating such people as cheaply as possible, and detaining them as long as possible, so that they did not reproduce themselves. The most successful superintendents were deemed to be those whose asylums had the lowest weekly maintenance rate, and whose patients were always kept in safe custody. An escape was indeed a serious matter and until 1924 a notice giving the full name of the patient, his state of mind at the time of, and the circumstances attending, the escape had to be sent to the Board of Control in every case. This information was intended to enable the Commissioners to fix the responsibility for the

patients who are emotionally ill, and one of the main tasks of the Medical Superintendent is to study and improve the relationships existing between the various members of the staff of the hospital, their relationships with the patients, as well as the relationships between the patients themselves.

A mental hospital is a strange institution; indeed, every mental hospital may be said to be unique, with its own singular and inimitable pattern of culture (8). This was true before 1948 of hospitals belonging to the same County Councils, and is true today of hospitals coming under the same Regional Hospital Board or even the same Hospital Management Committee.

In spite of the fact that 80 per cent. of all admissions are discharged, more than 80 per cent. of all the patients in hospital at any one time have been there for 12 months, or over; indeed quite an appreciable proportion of the patients may have been there for over 20 years. Female nurses and junior doctors come and go, but there is a hard core of old hands, consisting of male nurses, artisans, senior female nurses, senior doctors and sometimes medical superintendents, who appear, like the long-stay patients, to go on for ever. These are the people, the long-term patients and staff, who are responsible for the pattern and culture of the hospital, and for handing on its traditions for better or for worse, from generation to generation.

This is the community which provides the atmosphere in which the new patient is treated, the young nurse and the young doctor are trained, and, according to a recent report of the Expert Committee on Mental Health of the World Health Organization, this atmosphere may be the most important single factor in the efficacy of treatment. Let me quote their words in full: "The most important single factor in the efficacy of the treatment given in a mental hospital appears to the Committee to be an intangible element which can only be described as its atmosphere; and in attempting to describe some of the influences which go to the creation of this atmosphere, it must be said at the outset that the more the psychiatric hospital imitates the general hospital, as it at present exists, the less successful it will be in creating the atmosphere it needs. Too many psychiatric hospitals give the impression of being an uneasy compromise between a general hospital and a prison. Whereas, in fact, the role they have to play is different from either; it is that of a therapeutic community. As in the community at large, one of the most characteristic aspects of the psychiatric hospital is the type of relationship between people that are to be found within it. The nature of the relationships between the medical director and his staff will be reflected in the relationship between the psychiatric staff and the nurses, and finally in the relationship not only between the nurses and the patients, but between the patients themselves" (9).

The atmosphere within a hospital is largely the result of the feeling of tension experienced by the various members of the staff in carrying out their daily duties.

Whilst some of the causes of tension may be the result of faulty administration, Henry (10) has suggested that much of this tension, which is responsible for the atmosphere, is the direct result of the administrative structure. Many workers are responsible to more than one superior. The ward sister, for example, may receive instructions from the assistant matron, the ward doctor, the consultant, and the medical superintendent. The greater the number of persons to whom she is responsible, the greater the danger of disagreement, the greater the tension, the worse the atmosphere. Other factors which increase the tension are the power of the various people to whom she is responsible, and the degree of overlap. It is easier for a sister, for example, to work under

one doctor and one assistant matron, than two doctors or two assistant matrons. Factors which tend to reduce tension, on the other hand, are a high measure of agreement amongst the worker's superiors and consistency of commands. A ward sister can work under ten doctors without tension, provided they all tell her to do the same thing in the same way. Tension can also be reduced by giving the worker and the patients a feeling of participation in any decisions made.

Unfortunately a certain amount of multiple subordination is inevitable in the mental hospital, as it is in industry, and today even in the Army.

To overcome some of the inherent defects in mental hospital organization, group therapy, of the administrative as well as of the purely therapeutic kind, can contribute materially to the reduction of tension and to the improvement of the hospital atmosphere.

By administrative group therapy, I mean indirect, as distinct from direct, group therapy, which deals with problems arising directly from the patient's own illness. Many of the troubles and tension arising within a closed community like a mental hospital, can be relieved as dramatically and effectively by group discussion as the scalpel inserted into an abscess lets out the pus, relieves the patient of pain and tension, and replaces a feeling of malaise by one of well-being. When confronted with a disturbed patient, whether in the ward or in the home, we should ask ourselves not only what is wrong with the patient, but also what is wrong with the ward or with the home. It is only too easy to deal with the patient rather than the total situation, and sometimes even the wrong patient at that.

In spite of the great advances in scientific methods of treatment in recent years, perhaps the most important change from the patients' point of view has been the return to moral treatment. This is particularly true of the long-term patient in the mental hospital.

Martin Loeb (11) divided the people in mental hospitals into two status-conscious groups, the "haves" and the "have nots", the "haves" being the members of the staff who were in possession of keys, the "have-nots" being the patients. With the rapid increase in open wards, possession of "the key" has lost much of its prestige-value, and the patients' self-respect has considerably grown. Indeed, although there is still plenty of scope for improvement, the mental hospital of today has become a relatively comfortable place to live in, and perhaps one of the dangers of sending a patient to a mental hospital is that he may find it so comfortable that he settles down only too readily and becomes completely institutionalized. He may not want to leave the hospital and even after discharge he is often only too ready to find an excuse for returning.

It is not surprising, therefore, that the admission rate to mental hospitals in England and Wales increased from 20,000 in 1929 to 71,000 in 1954. One wonders whether the number of admissions will continue to increase at the same rate during the next quarter of a century!

Fortunately the numbers remaining in our mental hospitals have not shown a comparable increase, but as most of our mental hospitals are grossly overcrowded, it is difficult to state with certainty whether this is due to lack of beds or to improved methods of treatment.

There is an unfortunate tendency on the part of mental hospitals today to boast of their high rate of turnover, and it is assumed that the higher the turnover, the better the hospital, and the greater the credit due to the doctors. Is this a rational way of looking at things? It is high time we, as psychiatrists, should take a leaf out of the book of our Medical Officers of Health, and ask

escape. A patient was deemed to have escaped if at any time during his pursuit he was lost sight of, even though he might shortly afterwards be seen and recaptured. A patient allowed out on parole who broke his parole by not returning at the specific time was deemed to have escaped, and notice had to be given. Accordingly one cannot help getting the feeling that the asylum during this period was more like a prison than a hospital and that the Lunacy Commissioners and the Medical Superintendents alike were more concerned with the protection of society than the welfare of their patients.

The modern era in psychiatry with its emphasis on active treatment may be said to date from the introduction of malaria therapy by Wagner Jauregg in Vienna in 1917, but it was several years later before its use became widespread in this country, and my first four years in psychiatry were spent in a mental hospital where malaria therapy was not allowed, the Medical Superintendent having fears that the mosquitoes in the local pond might become infected, with disastrous results to the local community. The sight of a ward full of bed-ridden patients in the third stage of this disease, some of whom were so emaciated as to be reduced almost to mere skin and bones, is one never to be forgotten. Malaria was certainly a very great advance in the treatment of general paralysis, but not to be compared in importance with the introduction of the antibiotics, as a result of which the disease has been practically eliminated. There must be many among our younger colleagues here today who have never seen the disease run its full course.

The elimination of general paralysis has transformed our infirmary wards, which thirty years ago were regarded as the most active in the hospital, and usually staffed by the most skilful nurses. I have been around an infirmary ward within recent years, only to find that all the patients were up and about, and even when there have been a few patients in bed, they were mostly elderly people, who could equally well have been looked after in the geriatric wards of a general or chronic sick hospital. Another great advance that has helped to shape the mental hospital of today was the introduction of convulsion therapy in the form of cardiazol by Meduna and electro-shock by Cerletti and Bini.

When I took over the superintendency of Warlingham Park Hospital, or the Croydon Mental Hospital, as it was then called, 21 years ago, in one of the male wards there were 19 desperately suicidal patients, and the prevention of suicide amongst the patients demanded constant vigilance by the nursing staff, and was indeed a source of great anxiety to the doctors as well as to the nurses. Today a large proportion of our depressed patients are not even admitted to the mental hospital, but are given E.C.T. as out-patients in the local general hospital; some are given E.C.T. with other forms of treatment immediately after admission to the hospital. The result is that we very seldom have any patient who is deemed to need constant observation as a result of his suicidal propensities. I have always felt that constant observation can have an adverse effect on sensitive minds and might quite easily drive some patients to suicidal attempts. At the present time there is no patient in this hospital under constant observation. The ward that used to house the nineteen suicidal patients is now like the other wards of the hospital, completely open. Other advances in treatment in the physical field have been insulin coma treatment and pre-frontal leucotomy. After a period of wild enthusiasm following their early introduction, and possible misuse for conditions for which they were not intended, followed by a period of scepticism and even downright condemnation, most experienced clinicians agree that in the present state of our knowledge, and with the limited range of therapeutic weapons at our disposal, these two methods of treatment,

however much one may dislike them, should not yet be discarded. The most recent advances in the physical field have come from the department of pharmacology. To ensure success with the tranquillizing drugs, it appears to be necessary to be early in the field, and also full of enthusiasm; the more sceptical investigators who come on to the field a little later are often just as successful with their placebos as with the tranquillizers themselves. It would almost appear as if the mentally ill develop a tranquillizer resistance, even those who have never taken the drug themselves, when a drug has been in use for some time, in the same measure as some bacteria develop a resistance to antibiotics; or are the failures due to a lack of enthusiasm on the therapists' part? Nevertheless, I feel we may confidently hope for exciting developments in the field of pharmacology within the next few years.

Just as there were the advocates of moral treatment in our mental hospitals a hundred years ago, as well as advocates of purely medical treatment, so today, whilst some of our colleagues emphasize the value of physical methods of treatment which I have just outlined, others lay stress on the importance of occupational therapy, recreational therapy and socio-therapy, which are today's equivalent of moral treatment.

The modern era of moral treatment in this country may be said to date from the year 1928, when a group of medical superintendents, under the auspices of the Study Tours section of this Association, paid a visit to the Dutch mental hospitals and returned having been astonished by what they had seen. The Dutch mental hospitals were a hive of activity, even their advanced schizophrenics were hard at work. A little while later they visited Germany, and saw for themselves the work of Dr. Simon, who may be regarded perhaps as the pioneer of occupational therapy in this century, at the famous mental hospital at Gütersloh. In 1933 the Board of Control, whose active and enterprising members had all visited the Continent, published their very helpful booklet on occupational therapy, which provided further stimulus to our mental hospitals. There is only one criticism of it that one might perhaps offer, and that is its tendency to regard occupational therapy as a special form of treatment administered by an expert, rather than as a part and parcel of the daily life of the hospital, in which every patient and every member of the staff plays a part.

Patients come to mental hospitals in order to learn to live with other people, and to do that successfully they can reasonably be expected to contribute something to the welfare of the community in which they live. Looking at it from this angle, it is easy to see that work in the gardens, on the farm, on the ward, the kitchen or the laundry, may not only be more satisfying to the patient, but also more therapeutic than making leather handbags or woollen rugs in the arts and crafts centre. The role of the patient as an active member of the hospital team, promoting his own recovery through his contribution to the work of the hospital as a whole, brings us to the concept of the mental hospital as a therapeutic community, as an instrument of treatment in its own right. We, as doctors, are apt to flatter ourselves by attaching undue importance to specific methods of medical treatment. From the patient's point of view it is the total picture that counts, it is not the daily, weekly, monthly, or six-monthly hour he spends with his doctor that matters so much as what happens to him in between these periods.

Great attention has been paid in recent years to the importance of the emotional relationships existing between the members of any working group, and it is hardly necessary for me to emphasize the importance of good emotional relationships between the members of a team engaged in the treatment of

ourselves whether something more cannot be done in the prevention of mental illness, and, when prevention has failed, whether arrangements can be made for looking after the mentally sick in the community in preference to admitting them to the mental hospital. The Medical Officer of Health does not boast of the high turnover in the fever hospitals; on the contrary, a few cases of typhoid or diphtheria in his area might well be regarded as a reflection on his professional competence, and even lead to a public enquiry. The doors of some of our fever hospitals are closed, not because of the fact that the beds are full, but because of lack of patients.

If we are going to achieve anything like the results obtained by our Public Health colleagues, then I feel that we shall have to revise radically our conception of the roles, both of the mental hospital and the psychiatric team in the Mental Health Service. I believe every psychiatric team, and in the team I include other workers besides doctors and nurses, should have its own catchment area and should be responsible for the domiciliary services as well as for staffing the mental hospital serving that area. At first, no doubt, their duties would be mainly within the mental hospital, but there are already signs that the centre of gravity of the Mental Health Services is shifting away from the mental hospital. Since 1930, there has been tremendous growth of out-patient services, and in 1954 the number of new patients seen for the first time at out-patient clinics exceeded the total number of admissions to mental hospitals, but unfortunately, the facilities for treatment as distinct from diagnosis (apart possibly for E.C.T.) are still very meagre.

There are too many mental hospitals at the present time that have no community responsibilities, they are able to pick and choose their patients, and very often the sicker the patient, the more he needs in-patient psychiatric care, the more likely they are to refuse him—particularly if the patient is not of the type likely to improve their turnover.

A psychiatric team, with a definite catchment area, based in the community rather than in the mental hospital itself, but nevertheless responsible for all the mentally ill of that area, whether inside or outside the mental hospital, would develop a much better conception of the mental health problem as a whole, and both doctors and nurses would get a clearer idea as to who should and who should not be in a mental hospital. Within such a service the mental nurse would have an increasingly important role to play, particularly in instructing and assisting relatives in dealing with difficult patients and in assisting the psychiatrists in carrying out treatments in the out-patient clinics and in the patient's own home. An opportunity for working in the community in this way would no doubt be found attractive by many potential psychiatric nurses who, at present, are repelled by the prospect of spending a life-time amongst the mentally ill within the mental hospital.

With adequate psychiatric and nursing facilities within the community itself, it should be possible to deal with a substantial number of patients, who now have to be admitted to mental hospitals, at home or in out-patient clinics.

In general, admission to mental hospitals would be for specific treatments which could not be given in the patient's own home, and then for a limited period only.

Those of us who have worked for a time in mental hospitals, particularly open door mental hospitals, often ponder over two points. The first is the extent to which the patient's symptoms are the result of the conditions under which he is treated. A schizophrenic whose relatives are prepared to look after him in his own home does not deteriorate or regress to the same extent as the

schizophrenic in the mental hospital, particularly if he is kept in a large ward where it is impossible to give him much individual attention. The second is the number of patients in the mental hospital who could, with a little extra help, be looked after within the community. We ran a ward for three years without a nurse, yet when one of these patients was discharged, she almost invariably returned in a month or two. To deal with these problems we need an adequate domiciliary service of psychiatrists and mental nurses.

Judging by what one reads, there appear to be some people who think that all we need to put the mental hospitals right are bricks and brawn, more bricks for bigger and better mental hospitals, and the brawny pairs of arms and hands of nursing assistants for washing, dressing and restraining the patients within their walls. I prefer to put my faith in brains, the brains of doctors and mental nurses, who will teach the patient to wash and dress himself, his relatives to tolerate his shortcomings, and restore him to play his full part in the society to which he belongs.

Indeed, we live in a strange world, and it has been said that the standard of civilization of a country may be judged by the number of mental hospital beds per 1,000 of the population, the United States of America being in the lead, ourselves, France and the Scandinavian countries following hard at their heels. Is there no better solution for looking after the deviants and helpless in our society than the long-term mental hospital?

The younger generation of psychiatrists have a tremendous task ahead of them. Will they remain within the mental hospital dealing with end results, trying to control the flood of patients coming in by baling them out from over-crowded wards, or will they go right out into the community, not just to out-patient clinics, but into the homes, the schools and the factories, and endeavour to deal with this flood by turning off the tap at its source?

The other day an Infectious Diseases Hospital closed down and was put up for sale, not for lack of staff, but for lack of patients. Perhaps those who are coming after us will regard the period through which we are now passing in psychiatry as the mental hospital era, and maybe at the Annual Meeting of the Royal Medico-Psychological Association in 2056, a coach trip will be arranged to pay a visit to the last of the big custodial care long-term mental hospitals before it is finally converted into a holiday camp!

“So runs my dream, but what am I?

An infant crying in the night,

An infant crying for a light

And with no answer—but a cry.”

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THE THIRTY-FIRST MAUDSLEY LECTURE: PSYCHIATRY AND PUBLIC HEALTH

By

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WHEN the Council greatly honoured me by their invitation to be the Maudsley Lecturer for 1956, my first concern was as to what subject I could choose for my remarks.

Since 1939, except for some two years after the war ended, I have done much less clinical work than formerly, so that clearly I could not speak with profit on a clinical subject. In thinking of experience which might be relevant, I reflected first that I had worked in various capacities for the Army through two major wars, and therefore had seen something of the failures and the successes in the application of psychiatric insights to the solution of the therapeutic problems which arise in armies in war, and also to prophylaxis. Prevention is realistic from the point of view of winning a war—more important than therapy—and preventive medicine of any kind involves co-operation with many other disciplines and with branches of the Army other than medicine or psychiatry. The psychologists, the sociologists, the jurists, the administrators and the public health specialists have all got their own contribution to make towards the devising of measures to keep men and women healthy. Responsible laymen (the officers) are mainly responsible for the implementation of such measures.

It is interesting to reflect on some of the differences between the two wars. In the first world war, unforgettably, I had as a doctor to attend the executions at dawn of several men who had deserted in battle from the regiment to which I was attached. In the second war, the death penalty for cowardice in face of the enemy was removed, and this led to gloomy prophecies that far more people would break and run. In fact, proportionately to the number of troops engaged in active fighting in the field, there were fewer cases of desertion in face of the enemy in the second world war than in the first.

The United States Army medical history of the first war had told us of their realization that their worst soldiers could become their best diggers; or in other words, better selected work for the lower intelligence groups could bring greater efficiency and greater freedom from breakdown. Learning from this experience, and after very many tough and prolonged struggles with the authorities, we were able to demonstrate in the British Army in the last war that this was indeed true. As is well known, the experiment of transferring dull men into a corps where they would have manual work well within their competence was highly successful, both from the point of view of the war effort and of the individual men concerned.

These changes in outlook, and the results that were realized, were both due to the influence of psychiatry. In part they resulted from the work of the psychiatrists in the War Office Committee on "Shell Shock" which reported after the first war, and in part from the re-thinking of the prophylactic issues at the beginning of the war in 1939.

In the second place, my thoughts turned to this present title because since 1948, when this Association, with other bodies from various parts of the world,

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founded the World Federation for Mental Health, I have had the privilege of being closely associated with it. I have had the opportunity of getting glimpses of the ways in which psychiatric activity is developing in many countries of the world, and in addition to meeting and learning from psychiatric colleagues in those countries, I have also encountered men and women in public health in the Ministries of Health and in the universities of those countries, and have come more and more to associate the public health effort with certain aspects of the task of psychiatry. I have become convinced that the present trends and developments throughout the world demand increasingly close links between those who practise psychiatry and those who are specifically concerned with public health.

These were the reasons, therefore, for my choosing to-day's topic. Having decided, my next thought was: Has it anything to do with Dr. Maudsley, in whose honour these lectures are delivered? Naturally, I looked up some of his writings, but then consulted the one man who I felt was likely to be most knowledgeable about Henry Maudsley, and he wrote to me saying: "I don't recall any statement by Maudsley about the preventive or public health approach to psychiatry . . . His general outlook was so pessimistic about the possibilities of benefiting society through broad social measures that I would be surprised if you found anything which one could appropriately quote in a lecture devoted to this topic." I made no further effort, after this, to find points of reference; but any doubts I had about the propriety of choosing this topic were dispelled when I remembered that in the Maudsley Lecture which I enjoyed most of those I have heard—that in 1950—Professor Aubrey Lewis related a charming fantasy of a return visit to the Maudsley Hospital by its founder. He described how he had taken him round the various departments, starting with neuropathology and then the other research laboratories: how he realized that if the visitor's entry into the clinical territories was too much delayed, it would be at the risk of a sardonic enquiry as to whether they treated any patients nowadays; after which Professor Lewis surmised that the visitor would find satisfaction in many other things, including the social approach to the study and treatment of childhood deviations, of occupational inadequacy, of neurotic deformity and suicidal despair (1). In these regions so much outstanding work has recently been done by, amongst others, the staff of the Maudsley Hospital that I felt reassured and comforted that in fact this discussion of yet another development in the relationships and responsibilities of psychiatry would be acceptable.

Since my choice of the title, I have inevitably seen other papers which have come out dealing with aspects of this topic, and I should like to quote from one which is in process of being published, but has not yet appeared, in which I read:

"The centre of gravity of the mental health service is rapidly moving from the mental hospital to the community which it serves, and perhaps the day is not far distant when the psychiatrist will spend most of his time, not as at present in the mental hospital, but in the community.

"The more time the psychiatrist devotes to work outside the mental hospital, the more conscious he becomes of the importance of social factors in the causation of mental illness, and of the need for an epidemiological approach with a view to dealing with such causes rather than with end results: and maybe he will conclude that the solution of overcrowding within the mental hospital may be better and more economically solved by turning off the tap at the source than by building bigger and better mental hospitals.

"There is room for much more active co-operation between the medical officer of health and the mental hospital. Just as the psychiatrist is spending more of his time in the community, so the medical officer of health and his colleagues should spend more of their time in the mental hospital. The vast majority of the patients in a mental hospital at any one time are homeless

and not in receipt of any active treatment. We need the help of the expert in social medicine to advise us whether such people can be more effectively or more economically looked after in the community than in the mental hospital. The mental hospital psychiatrist can contribute to the work of the Local Authority in the ante-natal and well baby clinics, the schools, the children's homes, the factories and in the education of public health nurses, health visitors, school nurses, school teachers, ministers of religion, supervisors in factories and the general public in the fundamentals of mental health." (2)

This is an extract from a paper written by our President, Dr. T. P. Rees.

Although medical historians, and, of course, readers of the Old Testament, are constantly presenting us with instances of early attempts at medical care, the use of what sometimes seem surprisingly modern psychiatric principles, and a concern for sanitary and public health ideals, both public health and psychiatry as we know them at the present time have been often regarded as neglected departments of medicine. Clearly there are some similarities between their development over the last hundred and fifty years. The consciousness of the need for public health measures, in a modern sense, began with concern about the disposal of garbage, waste and sewage. It is not much more than a hundred years ago that the first Inspectors of Nuisances started work in this country. Psychiatric work was at a stage then when society was still satisfied with the incarceration of those who deviated too much from the normal pattern of behaviour; in fact, public opinion had not moved far from the concept of witchcraft and devil possession, and alienists were in short supply.

The embryonic public health organization moved into its next stage, of concern about the control of communicable diseases, even before much was known about the bacteriological origin of these conditions. The mental hospitals at the beginning of the nineteenth century, under the stimulus of Pinel and Tuke, and later of Dorothea Dix, began to move into an era of better care for patients.

For public health the third stage of development was heralded by the bacteriological discoveries. The idea of tuberculosis control led to the development of measures for education about such diseases, perhaps the beginning of modern Health Education. The mental hospitals were in a somewhat similar phase where, with some beginning of public and professional instruction, there was better nursing, there were better doctors and more of them. This, indeed, was the time of Henry Maudsley's activity. This phase led on to the development in the last half-century of modern treatments, psychological and physical, the development of out-patient clinics, children's clinics, and more humane practices, which justified the use of the word "hospital" for the care of the mentally sick. In 1908 a group of prominent psychiatrists and others met in the Faculty Club at Yale University with Clifford Beers to found the first Society for Mental Hygiene.

The fourth phase for public health has been that of epidemiological studies, early diagnosis, prevention through education, sanitary engineering, inoculation, insecticides and so forth, all involving the necessity to study the environment and the social and economic factors in the community. In psychiatry we have perhaps slightly less aetiological knowledge than our colleagues in public health, and therefore more unsolved problems, but we too have developed our great extra-mural services, and at the same time our concepts of the modern mental hospital as a therapeutic community. We, too, for some years have been thinking in terms of prevention, and by the individual efforts of psychiatrists, psychologists and social workers, as through the activities in the field of mental health of intelligent groups of teachers, citizens and others, much has been done in the way of education which has certainly contributed to the better handling, and probably to the prevention of a good many of the

more serious neurotic and conduct disorders. As with the communicable diseases, so with psychiatric disorders, public education has increasingly involved the development of a sense of personal responsibility in patients and other members of the community.

The general physicians and, until recently, the laboratory research workers have probably contributed more knowledge to the practice of public health than they have to psychiatry, but despite that, British psychiatry, like British public health practice, has few if any rivals in any country in the world—to put the matter modestly—and it is my belief that there should be increasing liaison and co-operation between these two professional disciplines.

There is in fact no real conflict between the principles of clinical medicine and those of public health. We might perhaps quote Dr. Chesterman, who has suggested that the old phrase “Prevention is better than cure” might be changed to “Prevention is better *by* cure”. The physician attacks epidemic and parasitic diseases by curing them in the carrier stage, which in fact is prophylaxis. Malaria cannot be eradicated only by spraying oil on stagnant pools or by better drainage. We in psychiatry, too, look after the carriers—those with distorted attitudes and poor inter-personal relationships, who can so easily create emotional disturbances and stress for other people.

Public health has set itself the task of tracing out the roads which lead towards the development and spread of epidemic disease, so that it can then hope to block those roads and so prevent further trouble. Psychiatry, planning for greater immunity or freedom from psychiatric breakdown and much socially unacceptable behaviour, has attempted to make similar discoveries and to find ways in which by education or some form of social action we can stem the tide of mental ill-health.

There are primary and secondary approaches to prevention. Secondary prevention of psychiatric breakdown is provided increasingly through the therapeutic work of child guidance clinics, the out-patient departments and the improved results of early treatment of the psychoses. Primary prevention, which aims at modification of those environmental and social factors which might create emotional instability in the early years of life, although much is achieved by child psychiatrists, P.S.W.s and others, is far more difficult, and its efficacy is as yet hardly proven. It seems clear that we are still waiting for many more facts before we can hope to prevent the development of psychosis. It would, however, appear that we already know enough to go far towards blocking many roads that lead to the development of the psychoneuroses and the allied conditions.

We have to accept the fact that many clinicians in psychiatry, as in general medicine, do not have much serious interest in prevention or in the development of techniques that might help to achieve it. Our training as physicians is no doubt responsible for this, for I doubt whether clinicians are by nature any less socially minded than the average citizen. I am sure that psychiatrists are distressed by the large number of patients who should be under treatment; but their training has been to diagnose and treat the disorders of individuals. They still are not taught very much of the public health approach and how to organize preventive programmes in the community. We are taught little about how to consult and work with people from other professions, and only learn this later on by hard experience. We are not trained to teach, nor to evaluate programmes that the various government and voluntary agencies propose or carry out to control illness or promote good health.

These things are changing, fortunately, because there is now more teaching about the principles of mental health to medical students, which should make

them better doctors, and also lead them to extend their concepts of medical work to include prophylaxis where that seems possible.

It was interesting in the last war to see how under the stimulus of the necessity to keep people fit in order to meet the manpower problem, medical men tended to develop a concern for preventive measures. One thinks, for example, of Hugh Cairns, who, as consulting neurosurgeon to the Army, confronted by the large number of head injuries to motor cyclists which were occurring in the early days of the war, gave much of his time and interest to the scientific development of crash helmets. Experienced psychiatrists and analysts in the Army, after a phase of mild hesitation and some longing for therapeutic opportunity, devoted the majority of their time to studying the social and environmental factors which led to breakdown in the Army, and to the devising of techniques which could not have been arrived at or been successful but for their psychiatric insight and knowledge.

Perhaps we need the urgency of war to turn the thoughts of professional men and women to the practical problems of the application of their experience in the field of prophylaxis. Is it the lack of such stimulus, is it a fault in our training, or is there some other factor still which determines that the majority of psychiatrists in every country are taken up with the urgencies of their clinical and research work? Do they need the relative feeling of certainty that they gain from dealing with problems of individual patients, so that they seem at times to be almost as dependent on their patients as their patients often are on them? Adolf Meyer was thinking of this when in 1930 he contrasted "mere mending" with a larger concern for prevention.

Lord Adrian, in an address to the Society of Medical Officers of Health which was published in the *British Medical Journal* recently, concluded by saying:

"I have spoken of the gratitude which may come the way of the clinician and ought to come equally to those who keep us out of his hands. We show our gratitude now to those who protect our health by loading them with new cares and giving them little else. But the climate of opinion is favourable to prevention. Those who have to organize it must miss the contact with patients which is one of the rewards of medical work. They have to spend their time with Councils and Ministries, receiving circulars and writing reports. Yet it must be some reward to know that the whole community is in their charge. The clinician is fortunate in saving occasional lives, but the Public Health Services preserve the lives and may in time preserve the sanity of millions." (3)

One need not be pessimistic, however, about the contributions to this wider field which are demanded from us as psychiatrists. A great deal more is being done at the present time than ever happened before. There seems to be evidence that in the last year or two those who are responsible for different parts of the National Health Service have become aware that to think of it as a national sickness service is less urgent, and they are now beginning to think in terms of the establishment of health and the prevention of disease. The joint-user plans which are operating in many places between consultants under the Regional Boards and the Local Authorities who are responsible for preventive services appear to be working well, and one understands that they are increasing in number. So that, following the line of the paper by our President from which I read you an extract, we should perhaps be concerning ourselves more with the problems of inter-relationship between these two points of view.

Public health activity has provided many striking examples of its effect on mental health, although sometimes this is unrecognized by the authorities who initiate the action. In the Ministry of Health in Peru, I spent some time with the department who were concerned with the rehousing projects. New houses and flats were being built to hold country people who had come in, and

for long had been living in hovels on the outskirts of Lima. On asking whether any kind of survey was being made of the general effect of such rehousing, I was told that the investigation of the matter had begun some months before any of the people had gone into the new houses, and was being followed up systematically, and that there had been a steady drop in the amount of physical sickness, of delinquency, of alcoholism and cocaineism, and these lower figures appeared to be maintained. I am sorry to relate that this social survey, as far as I know, was promoted much more by the responsible architect than by the local psychiatrists. The Minister of Health was taken aback when I congratulated him on the admirable work for mental health that his housing department was accomplishing, because he had never considered that aspect of the matter at all.

Psychiatry also has its adventures. In Israel last year the psychiatrists, being aware, as most of us are, that children who have been the victims of sexual assault tend often to suffer less from the effects of that episode than from having to appear in Court and be cross-questioned for quite a long period by defending Counsel, decided to get the law modified. In September, 1955, a new law came into force, that no child under fourteen who had been involved in a sexual assault might appear in Court. Three psychiatric social workers were appointed as child interrogators, and in each such case one of them gets the story from the child, and then appears in Court to give the child's story. Needless to say, this is objected to very strongly by many lawyers, who dislike the principle of hearsay evidence, but the practice is being carried on and very careful observation is being kept to see if there is any indication of injustice being done by this procedure, and also what its effects are on the recovery of the child concerned. This is an interesting and admirable adventure in preventive psychiatry which one hopes may succeed, and then be copied by other countries.

Our public health colleagues have certainly made contributions to the solution of many psychiatric problems. The campaigns against syphilis have almost removed the paretics from our midst; the efforts made to remedy problems of nutrition in many countries have not only removed those psychiatric disorders associated with pellagra, but they are achieving some other quite remarkable changes in many of the less privileged countries. The wartime experience that some of you may have had, when you saw large groups of inadequately nourished recruits coming into the Army for training from the jungles of India or the West Coast of Africa showed that those who were suffering from chronic malnutrition were unable to think and function as normally intelligent men, whilst in a matter of some weeks of adequate and suitable feeding they demonstrated that their average intelligence was no lower than that of men in the Western armies.

An interesting problem has come to the fore lately. Kwashiorkor, which affects large numbers of small children, especially in sub-tropical and tropical countries, is apparently linked with protein malnutrition, and has been regarded as a nutritional state by the medical and public health groups. It has, however, definite psychiatric symptoms associated with it of retardation and depression. Some investigation is at present going on to try and discover the inter-relationship of the physical and psychological factors.

In a children's hospital in Peru I was shown through a large ward full of small children with kwashiorkor—little creatures with pot bellies, many of them with the curious streak of red hair that seems to be associated, and all of them quiet, depressed, apparently incapable of responding to any friendly stimulus. They were almost like the orphanage children who are seen in the research films made by Dr. René Spitz.

As another example, think of the parasitic diseases which public health workers are attempting to eliminate in so many countries. A senior and experienced psychiatrist, on return from a survey of an African country, reported that it appeared to him that the whole of the peasant class in the country were demented. This was related not only to their inadequate nutrition, but also to the fact that most of them had one, two or even three concurrent parasitic infections. Those who are concerned about the major health problems of humanity have some very awkward facts to face. Decreased infant mortality, medical care and the longer expectation of life, little or no family planning, and improved capacity in people who are no longer underfed and sick, suggest the stupendous task that developing countries, with the help of the Food and Agriculture organization, must face in finding the means to feed the increasing population. Furthermore, in nations all over the world, with better intelligence there must be better education, and with the introduction of Western methods for raising the standard of living there is likely to be an increase in the emotional problems and difficulties—which brings us to face the question of our own profession's responsibility.

In the last years there have been a few more surveys of psychiatric morbidity, both urban and rural; Japan, Nova Scotia and Taiwan are examples. These are of great importance, because not only can they add to psychiatric knowledge, through studies of aetiology and the comparative incidence of various disorders, but they also throw light upon the social and economic factors which are responsible for making those who suffer from psychoses into a community problem, and for creating many of the tensions and stresses which lead to the development of neurotic illness. There are countries for which we in the United Kingdom have had responsibility which are now facing a steady increase in overt psychiatric problems. The one trained psychiatrist in Nigeria, where there is a population of 32,000,000 wrote in a letter the other day: "African societies are rapidly changing—culturally, socially and economically—and the psychological repercussions are spectacular. The process of adjustment would be a tempting subject for investigation alongside the more conventional psychological enquiries." In the Sudan, with approximately 18,000,000 people, there also is but one psychiatrist at the moment, and he gives a very similar report. Dr. Lambo in Nigeria and Dr. Tigani in the Sudan have obviously got enough clinical work to do, but it is even clearer that their task is one which can only be dealt with by public health measures and the closest co-operation with their colleagues in the administrative and prophylactic field.

There seems a probability, judging by such few figures as are available, that the incidence of psychosis is more or less the same everywhere. In countries such as I have just mentioned the changing cultural and tribal habits are no doubt bringing to light a great many people with psychoses who up till now have been kept and looked after within their tribal or family setting.

There is a more serious problem in the apparent relationship between the mechanization and industrialization which is going on everywhere in the world, and an increase of stress which leads to the development of emotional disorders, where apparently they had been relatively rare before. We are, of course, hampered here by the lack of statistics and factual evidence, and cannot compare the past with the present, but in almost every country of the world it appears that our colleagues in medicine are recognizing a steady increase in the numbers of psychosomatic disorders they are asked to treat. Anxiety states are increasingly obvious and conduct difficulties appear to be more numerous.

Certainly the most startling instance of this kind is in Japan, where addiction to what is called "the awakening drug" (i.e. philopon, a derivative of amphet-

amine) has assumed enormous proportions. Youngsters from approximately nine to eighteen years of age are said to inject themselves intravenously ten to thirty-five times a day, and the last figures given to the International Committee on Drug Addiction (reported in *The Times*) imply that there are a million and a half such young people addicted in Japan at the present moment.

It is fairly clear that improvements in communications, the efforts to build up industry, to mechanize agriculture and many other activities that all have the worthy objective of raising the standard of life, must inevitably change the cultural patterns of a country much more rapidly than has ever happened before. Women begin to go out from their homes to work, children are educated in a language of which their parents are quite ignorant, modern business methods demand in the cities that executives shall live and work in a western fashion, but they return home to spend their evenings in their own simpler and traditional habits. All these things are clearly tending to speed up the breakdown of what is called "the joint family system" in Asia and in Latin America. In every country and in every language there is the necessity to "keep up with the Joneses", and so with competition there comes stress. This challenges us, with the sociologists, anthropologists and administrators, to try to discover the facts, and if the facts be proven, then to find how the good results of modern development, helped on by Technical Assistance from various sources, can be allowed to go on and yet not produce some of the disturbance and deterioration which appear to be related to rapid change.

Perhaps it is not only in the less privileged countries that this situation arises. In our own country and in the United States, where the cultural patterns change more rapidly than here, there may be similar reactions. Perhaps better understanding of these problems, leading to social action, could be more effective than providing the extra thousands of psychiatrists who are so often asked for.

Looking at the wider scene, and the needs of our neighbours in the world, it is clear that psychiatry has some challenging problems to study, and the chance of co-operating with administrators and particularly with the public health services in getting nearer to a solution. The Indian sub-continent contains 480 million people, and less than one hundred trained psychiatrists. The People's Republic of China has a population of 600 million. The last official information that I am aware of was that there were eight psychiatrists in China, but I have reason to think that at the moment there are probably about two hundred. The breakdown rate in that country is becoming so serious that, as I was told in Hong Kong, mental health has been made a first priority by the Peiping Government.

The public health services did much to eradicate many of the great epidemic diseases with quite insufficient and incomplete knowledge of their exact cause. We have in psychiatry many facts, gained from experience, of which insufficient use is being made even in our own country, let alone in the less privileged countries. Above all, however, we do need more basic knowledge, which can only come from research. A good deal of action has been taken as a result of the emphasis laid on the effects of the insecurity of small babies owing to separation from their mothers, and this is a type of fact-finding which can well be regarded as a pattern for what we need in the future. It provided the evidence as to why some children at any rate suffered in this way, and something could be done, and has been done about it in many places.

The Civil Resettlement Units of the British Army at the end of the last war were of interest, since they were another contribution which came direct from psychiatric observation and thought. The discovery in the second half

of the war that those who had been prisoners of war, when they returned to this country, showed not only greater difficulty in settling down without conduct abnormalities, but also showed an unusually high incidence of depressive illnesses, led to the planning for the Civil Resettlement Units. It was recognized that the desocialization of prisoners of war through their experiences over some years in prison camps, and the obvious difficulty of dealing with their confusion and identity crises on return either to civilian life or to the Army, demanded that something should be done.

These Units were designed to give great freedom from military routine, much opportunity for learning through group discussions, and a chance of a gradual introduction to job possibilities for the future. That they were a prophylactic success was demonstrated by the careful follow-up a few years later, which showed that as regards the various criteria of resettlement into civil life, the men who had been through these Units were twice as successful as the men who had not chosen to go through them (4).

Another activity may be quoted. When in the later part of the war the battle schools were introduced, to speed up the preparation of new troops for actual fighting conditions, an idea was developed for toughening these men and fitting them for battle by training them in very crude ways to hate the Germans. A psychiatrist was asked for to help on this "good work", and being loaned to the battle school apparently for this purpose, was able to discover within a few days that many of the people who had been thought to be most successful as students of this course had apparently both become sick and lost all interest in fighting or in the war as a whole. In other words, it seemed probable that hate produced artificially in this way was leading to depression in many cases. In consequence, it was possible to reverse the policy of the battle schools and to devise many better methods of "inoculating" people (as it was called) against the stresses and hazards of battle, with results that were very satisfactory.

I referred earlier on to the "War Office Committee on Shell Shock" after World War I, and the part that psychiatrists played through that Committee in modifying conditions for the Second World War. This had an educational impact, since from then on the training manuals of the different branches of the Army contained a statement that everybody experienced fear—it was indeed a normal thing—though one still had to go ahead and do one's job, in spite of the fear. It was this change of attitude, with the loss of shame at experiencing fear, which seems likely to have accounted for some of the diminution in the incidence of true war neuroses and the almost total absence in the British Army of conversion hysteria. By comparison, the Indian Army had had little education of this kind, and the psychiatric wards of Indian Military Hospitals were full of cases of gross motor hysteria, more dramatic even than the cases at Seale Hayne during and after the first war. These are just instances of the way in which preventive techniques which come from psychiatric insight contribute to the solution of mass problems which are essentially within the field of public health.

The Memorandum on the Future Organization of the Psychiatric Services put out in 1945 by the Royal College of Physicians of London said:

"Where psychiatry begins and ends has not been settled. With the development of preventive medicine, its borders will become less rather than more definite."

After speaking of the links with education, with criminology, psychology and public health, it added:

"Psychiatry has less definite boundaries and marches with more non-medical territories than any of these. It follows that psychiatry must make even fuller provision for liaison than other branches of medicine." (5)

It can I suppose be assumed that if there has been some failure on our part to take a full share in the wider health aspects of medicine, this may be why social medicine has developed, to meet part of the need. Possibly also, this is why the psychologists, who have at times not been made fully our colleagues and fellow-workers, have increasingly regarded work for mental health as their own prerogative. Psychologists are often averse to the term "mental health". It was interesting, at the immense annual meeting of the American Psychological Association two months ago, that whilst nearly half the papers which were delivered were apparently dealing with mental health problems (and there were twelve hundred speakers in the printed list), the words "mental health" only appeared in the titles of about ten papers.

I believe that the practice of mental hygiene and the task of achieving better mental health fall somewhere in between the jobs of psychiatry and of public health, and I believe that the psychiatrists should be the backbone of such activities. We could make good use of inter-professional and other voluntary organizations, but such activity needs more scientific backing in the form of research results both from psychiatry and public health.

Jules Coleman in one of the Milbank Conferences in New York expressed this from the angle of psychiatry when he said:

"The contribution of psychiatry to public health is contingent upon an acceptance and approval of the philosophy and aims of public health, a willingness to work within its administrative and functional organization, and a recognition of the mental-hygiene objectives that public health has already achieved." (6)

If we as psychiatrists are indeed to play an increasing part in work for mental health, it might seem that we should be wise to pick out some particular priorities amongst the very large number of problems. The study of geriatrics and planning for better care of old people is extremely important, and is a responsibility for many of us, but from the point of view of the next generation it is perhaps less important than some other matters. A cycle of twenty to twenty-five years in the life span seems to present us with many of the most important points of approach. Starting, for example, with marriage guidance activities, we could help to ensure that people marry more wisely, and therefore have happier homes in which children can be brought up. We go from there on to the early problems of marriage, the anxieties and difficulties of the expectant parents, and to problems centring round childbirth and the period of infant welfare. From there we pass on to the difficulties of the pre-school period, problems of school (which include, of course, the problems of teachers), and then go on to vocational counselling, which at that period can help so many square pegs to find square holes. Then follow the two parallel lines, one which involves the problems of occupation and industrial life, and the other the problems of higher education, with the much neglected issue of the mental health of university students, who are vitally important to our communities whose leaders largely come through the universities. (There are only two psychiatrists officially involved with the mental health problems of the huge number of University students in Britain.) We come round the circle and find ourselves again at the point for marriage guidance.

Within this cycle of events we have the opportunity to make an impact on the most important phases of life at which people are most plastic and responsive; and it does not matter very much at which of these points we make our main approach.

It will be noted that the public health staff are already concerned with very many of the problems of these particular age periods—marriage guidance,

maternity clinics, infant welfare, school medical services, and in some cases the problems of industrial life. Psychiatry is increasingly occupied also with the education of those who operate in these various roles, and could be even more actively involved. We are perhaps likely to get the most valuable returns for our effort if we are concerned with research and with planned education in this apparently rather limited, but actually almost limitless field.

Education is needed. The public health men are increasingly ready to accept the fact that a psychiatrist or a psychologist can throw light on some aspect of their difficulties, but they are too ready to call him in as an outside consultant, since they have as yet insufficient understanding of their own to see the true nature of the problem and the possible solutions. Just as we have to learn much from them about methods and community activity, so they have much to learn from us about psychopathology, and the dynamics of child development and the reactions of individuals and groups.

Great advances have been made in education in our own profession. I personally can remember no single statement about health that was ever made to me by any of my distinguished teachers when I was an undergraduate. I remember a few points from our public health lectures, and a very few from the six demonstrations in psychiatry which I attended. I am quite sure that graduate teaching is excellent now; but I am not sure that undergraduates, who are mostly going to be family doctors, are everywhere getting as much education in the principles of mental health as they should have.

In some public health schools of the United States a large proportion of the time is devoted to problems of mental health, and it is good to see in some of the under-privileged countries the isolated psychiatrists who, limited inevitably in their clinical possibilities, are working closely with their Ministry of Health and public health officials in the design and execution of various administrative devices, and are actively teaching in medical schools and to the general student population.

It is not merely the psychiatric education of our own colleagues and the stimulus of further research which are so necessary. We also have, as our President has often reminded us, to carry a good deal of responsibility for the other groups of people who work in the field. I strongly suspect that more and more the first-aid psychiatry and the primary prevention of mental disease will fall to the family doctor and the public health nurse, who have full access to homes and families, just as the bulk of early surgical and medical techniques are their responsibility in the home. There will always be plenty of work for those of us who practise psychiatry.

As regards the public outside the main professions concerned with mental health, there certainly is a need for further education, because there are always new parents and new children to be considered, and there can be no end to this particular task, though we should have more and wiser things to discuss with them. I have a feeling that more intensive education, particularly of those who are carrying responsibility for other people in the educational, social or civic fields, pays a better dividend than general lectures, radio talks, or some other forms of approach we can make.

It seems not inconceivable that before many years have elapsed psychosomatic medicine, which is a term we have applied, most valuably, to a particular part of psychiatric work, may have outlived its usefulness, because psychosomatic medicine should, after a few more years of medical education, be just part of good medicine. In the same way, I think that social medicine and perhaps mental health work will become largely incorporated with public health, though

it would be disastrous if a great many competent psychiatrists, still keeping their touch with clinical and research work, were not at the same time directly concerned with the mental health responsibilities of public health.

In public health and in psychiatry, our predecessors in this country have led the world. We can still continue to do so, and my thesis in this address is that through mutual learning and active partnership with public health the contacts and contributions which psychiatry is making can continue and can be amplified, to the great benefit and effectiveness of our own communities, our nation, and our neighbour countries.

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THE THIRD ELEMENT OF SPEECH: PROSODY IN THE NEURO-PSYCHIATRIC CLINIC

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THE nomenclature of neurology is already so extensive and so chaotic that every proposed new term requires its apology and precise definition before being accepted—just as every term, new or old, should be weeded out, if it cannot be given a satisfactory definition.

When in a series of previous articles I have tried to introduce the term *prosody* (and its derivatives: dysprosody, hyperprosody, hypoprosody, aprosody) I had perhaps better formulate the apologia more explicitly. In order to do this let me first reiterate the definition of prosody, as consisting of the normal variations of

1. pitch,

2. stress, and

3. rhythm (not forgetting the important silent intervals—pauses),

which occur in speech.

In philological circles the term prosody (and the adjective “prosodic”, “prosodisch”) has long been employed by Trubetzkoy and others. The universally known French dictionary of Larousse gives the following definition of *prosodie*: “Prononciation des mots, conforme à l’accent et à la quantité.” The English *Chambers’ Twentieth Century Dictionary* gives prosody the following definition: “That part of grammar which treats of quantity, accent and the laws of verse or versification.” The term “prosody” is therefore by no means a neologism. But still it may have to be shown why it should be introduced into clinical neurology.

Having been interested in this element of speech since my youth, I have for very many years felt that the usual old terms for it, viz. “melody of speech”, “melody of language”, “Sprachmelodie”, “chanson de la parole” and similar expressions are inadequate, because they call forth associations with musical faculties which are unreal.

It is a common and an old experience that completely unmusical persons may have a pronounced and semantically expressive “melody of speech”, which in itself seems to savour of a contradiction.

A confirmation of the independence of the “melody of speech” of all musical faculties was furnished by a case that came under my observation during the last world war and which I have described in *Brain*, 1947: A young Norwegian woman who, recovering from a right hemiplegia and aphasia, caused by an extensive traumatic lesion of the left hemisphere, was left with a peculiarly changed language, the salient feature of which was such a complete change of her “melody of speech” that she was taken for a foreigner by everybody who did not know her. *In spite of this change of her “melody of language” her musical faculties were so good that her premorbid state could not possibly have been better in this respect.*

To regard this altered “melody of language” as an alteration of her musical faculties would in the face of these findings have been absurd and, searching for a non-committing, purely phenomenological name, I termed her condition

dysprosody, which was readily accepted by several prominent neurologists of Scandinavia and of Great Britain. Consequently I have also introduced the term *prosody* into our neurological terminology and have proposed for its alterations besides *dysprosody* the following terms: *Hyperprosody*, *hypoprosody* and *aprosody*, all denoting well-defined clinical conditions of some significance—particularly as regards the two last-mentioned modifications. I shall return to these alterations further on. But first a few general remarks about the development of *prosody*, which I consider the third fundamental element of speech.

In the first place it should be stressed that of all the three elements of human speech, viz. 1. vocabulary, 2. grammar, and 3. *prosody*, the last-mentioned element (*prosody*) is the oldest—phylogenetically as well as ontogenetically.

Even if one does not accept Schielderup-Ebbe's postulate that the dog has nine and the hen ten different kinds of expressive sounds, anybody who is sufficiently acquainted with dogs and chickens will know that they can express themselves to a certain extent by *prosodic* means (cf. the dog's high-pitched bark as a sign of glee and the low-pitched bark as a sign of hostility—and the cock's (or the chicken-mother's) syncopated and staccato calling to the hens (or the chicken) when a nice bit of food has been found—both definitely semantic (or propositional) expressions).

The small child usually starts exercising its *prosodic* ability before it can pronounce intelligible words or sentences. The careful observer will notice that a small child, still in that stage which the French call "*la période de babillage*", will frequently divide its chatter into periods resembling sentences. Let it be emphasized, however, that although the *prosodic* faculty only *begins* to develop at that early stage, the further development goes on besides the two other elements (vocabulary and grammar) through many years, and may continue throughout life.

First develops that *elementary* or "intrinsic" *prosody*, which is common to all individuals who speak the same language and dialect.

Then gradually, as intellectual needs arise and fail to find sufficient expression for the more subtle shadings in the mere choice of words and grammatical forms, a higher, more intellectual, more varied and also a more individual *prosody* develops. As also emotional states influence the *prosody* (mainly the strength of voice) from the very first, one can thus distinguish between

1. elementary, intrinsic *prosody*,
2. higher, intellectual *prosody*, and
3. emotional *prosody*,

without any fixed demarcation lines between them.

As illustration of *elementary prosody* it may here suffice to mention simple questions, which can be answered by yes or no. Here the last syllable is always pronounced at a higher pitch than the preceding ones. This questioning *prosody* may even override the arrangement of the words. Thus the simple sentence: "The doctor has come", will, when pronounced with a rise of pitch on "come", be equivalent to the question "Has the doctor come?" In other words, one and the same sentence may be a mere statement of facts, when pronounced with that drop in pitch on the last syllable which denotes finality. But pronounced with a rise in pitch on the last syllable it is turned into a question.

When we now turn to the *intellectual prosody*, a simple statement such as "Yes, he is clever", may be given different additional significance, if it is pronounced with raised pitch and stress on "*he*" or on "*clever*"—in the first case introducing an innuendo that other members of his family or his circle are not

so brilliant—in the second an insinuation that the person concerned may be lacking in other virtues. A pause after “yes” will in either case accentuate the derogatory suggestion. If, again, the same sentence is pronounced with “*is*” stressed and slightly raised pitch, the sentence becomes an emphasized attestation to the person’s acumen without any derogatory flavour.

When discussing a person (e.g. a candidate for an appointment) the prosodic way, in which his name is pronounced may tell a lot about the speaker’s opinion of the person. Here, besides the variations of pitch, the rhythm (particularly the pauses—“eloquent silences”) is particularly significant.

“Well, Tom Brown”, pronounced in a hesitating way, with a pause after “Well” and a raised pitch on “Brown” will betray some doubt about Brown’s qualifications. When the pitch is lowered on “Brown”, and the whole sentence pronounced not only hesitatingly, but also in a staccato way, it generally signifies a low opinion of the poor man. When, on the other hand, the very same words are pronounced quickly with a rising stress and pitch from the first to the last word, the significance becomes definitely laudatory, something like this: “Well, Tom Brown, that is the man we need.”

Some people have such a well-developed prosodic ability that—if they are influential enough—they may make or mar a young man’s career by merely mentioning his name without having praised or belittled him in actual words.

Even such straightforward simple words as “yes” and “no” may, by different prosody, be given a different meaning. By a rising pitch they may be turned from being firm assertions or negations into questions. And, mainly by hesitation, they may be given an expression of doubt, which approaches a “yes” to a “no” and vice versa. From our childhood we probably all remember how easy it was to distinguish father’s or mother’s firm “no” from an ever so slightly hesitating “no”, open to further discussion.

In a Danish play by J. L. Heiberg, called “Nei” (No), one of the outstanding features is the heroine’s bewildering an unfortunate suitor by saying “no” in so many different ways that the poor man does not know whether she means “yes” or “no”. This particular prosodic ability of making a “no” signify “yes” seems to be a female prerogative, yet by no means exclusively so, however.

This leads us on to what I would like to call PROSODIC GRUNTS (*sit venia verbo*)—a very important part of everybody’s “linguistic behaviour”. When listening to a person we betray our interest, our sympathy, our assent or our disagreement, etc., by interjections* or by other short words (e.g. oh; alas; fie; pooh; quite; quite so; perhaps; oh, no, etc.) or probably more often by inarticulate sounds, “prosodic grunts”, the prosodic flavour of which expresses our sentiments and opinions from enthusiasm to disgust, from approval to disagreement quite as clearly as articulate expressions and long sentences.

If for a moment we consider the question, What constitutes “a good listener?” we at once realize the role these prosodic grunts play. And if we further consider by what means we, in everyday life, judge the intelligence of our fellow human beings, we shall easily perceive that this judgment is not only founded on what they say and do (alas, more on what they say than what they do), but also—and probably as much, if not more—on their way of listening to ourselves, when we explain our wise plans or relate some dreadful or joyful event, etc. How the loss of proper prosodic grunts may influence our judgment of a patient’s intelligence and emotional life in the not infrequent states of

* According to Nesfield an interjection “lies on the borderland between speech and the inarticulate cries of animals”.

hypoprosody and aprosody will be dealt with in the following short survey of aberrations of the prosodic quality of speech.*

PROSODIC DISTURBANCES

In attempting to give a survey of the prosodic disturbances, I wish to stress the fact that hitherto the prosodic element in speech has not been studied systematically in a sufficiently large number of cases to allow final conclusions. Especially in aphasic disorders is this the case. When the prosodic problems—as I hope—will attract more attention in neuro-psychiatric medicine and can be studied systematically in a large number of cases this attempted (perhaps too simplified) survey may have to be modified.

The important hypoprosody and aprosody of paralysis agitans is, however, firmly enough established to allow a fairly full presentation.

The prosodic disturbances may be grouped into the following three categories:

1. *Hyperprosody*, characterized by an exaggeration of the prosodic variations.
2. *Dysprosody* (false prosody), where the prosodic variations, still present, are altered, stress and pitch being misplaced and rhythm often also changed from the normal.
3. *Hypoprosody and Aprosody*, characterized by a diminution or complete loss of the normal prosodic variations.

All these kinds of prosodic disturbances may occur as isolated temporary mishaps in normal persons under mental stress, particularly in that state of mind which we call "stage fright".

All of these may also, in different degree it seems, occur in the different forms of aphasia and should, in the study of these conditions, be given more attention than hitherto. They may also be encountered outside the field of aphasic conditions, as already mentioned.

1. *Hyperprosody* may occur in otherwise apparently normal persons as a sign of affectation, sometimes in combination with other signs of artificiality. (Histrionic type of persons.) It may further occur in maniacal, hypomaniacal and hysterical conditions. Finally, it may occur in aphasia of preponderantly motor type as an attempt at compensation, when the verbal expressions fail. It is often combined with exaggerated gesticulation and mimicry.

2. *Dysprosody* may be encountered in aphasic conditions combined with agrammatismus. In very rare cases it may be the salient feature of the aphasic disturbance, as in the case, described by me in *Brain*, 1947, already alluded to. Knud Krabbe has observed two similar cases of dysprosody and Knud Winther one of dysprosody combined with hypoprosody. (Oral communications.)

3. *Hypoprosody and Aprosody* may also be observed in some aphasic conditions. Personally I have observed it in very pronounced degree in a case of the overwhelmingly sensory type. In the motor type it is as the oldest of the three elements of speech (see above), generally less affected than the two other elements, viz. vocabulary and the grammatical faculty. In the motor type it may even, as already mentioned, be exaggerated in a compensatory effort to correct the wrong choice of words.

* The "prosodic grunts", here mentioned with a semantic value varying with their prosodic flavour are, of course, quite different from the inarticulate humming sounds of hesitation, involuntarily uttered by a speaker (or an unprepared schoolboy) searching for adequate expressions. These sounds of hesitation ("hum and ha") are monotonous and have no semantic (or propositional) function. (Yet a very artful speaker may sometimes be suspected of using such a "hum and ha" on purpose as an introduction for a daring or offensive utterance, trying to give it the appearance of being made inadvertently.)

It is in quite another field of neurology, viz. in *paralysis agitans* and similar extrapyramidal disturbances that loss of prosody has its greatest frequency and practical importance.

Here it may lead to isolation of the patient within the family circle on account of the impression of mental dullness—both as regards intelligence and sentiments—which the loss of prosody entails—an impression, which is in the great majority of cases entirely false. To understand how this comes about we must revert to what was said above, particularly about the importance of the “prosodic grunts” and the good listener.

Let me illustrate the situation with a few commonplace concrete examples: A son and partner of a paralysis agitans patient will tell you something like this: “Father is not so bright as he was. When I propose a new business plan to him, he no longer takes the same keen interest in it as before, nor does he seem to grasp the points”; which may all be due to the fact that the “prosodic grunts” (“hm” and “oh” in different prosodic clothing) are either missing or bereft of their prosodic qualities, betraying interest, assent or opposition, and that any comment has also lost its lively prosodic quality in expressing approval or disapproval.

The patient’s wife may get the impression that he has grown “cold and unfeeling” for the same reason. When she relates something joyful or something dreadful and sad he is no longer able to follow her narrative with the same adequate prosodic grunts of delight or sorrow and sympathy as before. And his verbal comments have lost that prosodic quality, which makes them ring true as an expression of genuine feelings. The frequent facial amimia or hypomimia will accentuate the appearance of unfeeling coldness and lack of understanding.* As a natural consequence it then frequently happens that the patient is not spoken to as often, nor in the same way as before. He begins to get isolated. Then, in his turn, he may feel sore about this altered mental atmosphere round him, and may become depressed, bitter and even hostile in his attitude to the surroundings. The vicious circle is now complete.

The possibility of such a development should not be overlooked and it should be incumbent on the physician to prevent such a tragic development by giving the surroundings an orientation about the misleading nature of these symptoms, thus making them understand that the disease has bereft the patient of his ability of *showing* his feelings and interests without this being a true sign of mental deterioration, as he may be (and generally is) as mentally alert as before, both emotionally and intellectually.†

When, in our day, attention has been so strongly focussed on psychosomatic ailments, it may be well to keep in mind that there are also somatopsychic ailments, probably as numerous and as important as the psychosomatic ones—possibly even more so. The one here outlined is a case in point.

Finally, an intriguing point has to be touched upon: Can anything be said about the localization of the prosodic faculty or of the lesions that cause its disturbances? As regards the prosodic faculty itself we are up against the same difficulty which confronts us in the localization of speech. Even though we can map out an area, where lesions are apt to cause aphasic speech disturbances, we cannot say that the faculty of speech is situated (or has its seat, its residence!)

* Even to the experienced clinician it may happen that when first talking to such a patient, he gets the impression of undue reserve and may even start wondering if the patient is slightly sarcastic or even hostile in his attitude towards the physician. This initial and transient feeling is quite understandable before any other signs of the disease have been observed.

† Hypo- and a-prosody may thus be just as fallacious as loss of facial emotional movements (hypemimia).

in such and such a region. We may be justified in talking of aphasic regions, but *not* of "speech centres". To stress this view I like to say that we speak (or ought to speak) with the whole brain. I think the same may be said of prosody: we probably prosodize with our whole brain. When, however, the prosodic faculty so often becomes deficient in paralysis agitans, we may probably be right in assuming that the lenticular nucleus (? the pallidal system) and/or *substantia nigra* belong to the structures that are necessary for the correct execution of the prosodic variations, which by no means signifies that prosody has its "seat" in these structures. In this connection I should like finally to quote Hughlings Jackson's too often overlooked words: "To locate the damage which destroys speech and to locate speech are two different things" (H.J., 1874). The same applies, of course, to prosodic disturbances and prosody.

SUMMARY

Prosody is one of the three fundamental elements of speech, the two others being vocabulary and grammar. It consists of variations in pitch, stress and rhythm, but is *independent of musical faculties*, wherefore such terms as "the melody of speech" and the like should be abandoned as terms which mobilize false associations. Prosody serves *semantic purposes* and enables us to convey meanings and subtle shades of meaning which the two other elements cannot express adequately. As important elements of language, in which the prosody is the sole semantic factor, the author mentions what he calls "*prosodic grunts*", inarticulate sounds closely related to interjections. Their importance is brought home to us by analysing the consequences of their loss, so frequent in paralysis agitans.

The prosodic disturbances can be grouped under the headings of 1. *Hyperprosody*, 2. *Dysprosody*, and 3. *Hypo- and a-prosody*. The occurrence and significance of these are discussed, with particular attention to the hypoprosody of paralysis agitans and its peculiar *somato-psychic* consequences. Finally, localization problems are briefly touched upon.

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FURTHER STUDIES IN THE THERAPEUTIC VALUE OF LYSERGIC ACID DIETHYLAMIDE IN MENTAL ILLNESS

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THIS paper follows a preliminary communication to this Journal two years ago (Sandison, Spencer and Whitelaw, 1954) and gives an account of the fuller experience gained up to the present time with lysergic acid diethylamide in the treatment of mental illness.

1. The results of a two-year follow-up of the 36 patients originally reported upon in 1954.
2. The results of treatment in all the patients (94) treated up to March, 1956. These have been followed up for a minimum of six months (September, 1956).
3. Observations on the technique of LSD treatment.
4. Description of a technique for treating psychotic patients with a combination of LSD and chlorpromazine.
5. A discussion of the present position of LSD in relation to psychiatry.

SUMMARY OF SOME RECENT LSD STUDIES

During the past three years increasing interest has been shown in LSD and allied substances. Studies have been carried out with lysergic acid monoethylamide, methedrine, mescaline, adrenochrome and 3,4,5-trimethoxyphenyl aminopropane (T.M.A.). All these substances have certain chemical features in common, and their psychic properties are similar in that when given in suitable doses they all produce hallucinations, changes in time and space perception and an awareness of material from the unconscious mind. Research into the action of these drugs has in recent years been directed into three main channels. *First*, studies of their effects on normal individuals in whom they induce a so-called model psychosis. As a result of these studies, valuable light has been thrown on the mechanism of the schizophrenic process. *Second*, some of the drugs, particularly LSD, have been used for the treatment of the psychoneuroses and on a smaller scale and in a more experimental manner for the treatment of the psychoses. *Third*, they have been used alone or in conjunction with other drugs in an attempt to unravel the complex biochemical disorders which may be associated with mental illness.

A considerable number of interesting papers have been published on the first and the third of these projects, but here we shall refer chiefly to the work of those authors who have reported on the use of LSD for the treatment of mental illness.

As far back as 1936 Guttman and Maclay suggested small doses of mescaline as an empirical therapy for derealization and personalization. Mayer-Gross (1951) appears to have written the first English paper which compares the clinical action of mescaline and lysergic acid diethylamide and suggests the possible uses of these drugs in treatment. Savage (1952) studied the effects of LSD in five normal controls and fifteen depressed patients. In the latter group three patients recovered and four patients improved after one month of LSD treatment in which 20–100 μ g. were given daily by mouth. Four patients showed no improvement. Benedetti (1951) gave two doses of 50 μ g. LSD within two hours of each other to a chronic alcoholic patient with marked psychocatharsis. Frederking (1953/54; 1955) used both LSD and mescaline for the treatment of neurotic patients who were refractory to psychoanalysis. Twenty-four cases were described and the therapeutic effect of LSD was considered better than that of mescaline. The paper is of interest to us as the author describes many LSD experiences which bear great similarity to the ones we ourselves reported in 1954. For example, he states that the LSD phenomena are either purely symbolical in character or they represent childhood memories, the latter often appearing in symbolized form. Many of these memories are accompanied by more or less violent emotions corresponding to the patients' problems. The recollections can go back as far as very early childhood, sometimes even to the moment of birth. The patient is able to remember to a large extent the experiences evoked during his intoxication and they can be discussed with him a few days later. Considerable caution is indicated in cases of extreme anxiety and of suspected schizophrenia. Sloane and Doust (1954) gave LSD to eleven healthy controls, twelve patients with predominant depression and seven patients with schizophrenia. These authors thought there were slight, clinically apparent changes attributable to LSD which were difficult to verify objectively. Anderson and Rawnsley (1954) gave 10–600 μ g. of LSD by mouth on 58 occasions to four normal subjects and nineteen psychiatric patients. In six cases LSD produced long-lasting favourable changes in the clinical picture. Abramson (1955) used LSD rather differently as an adjunct to psychotherapy, giving small doses, e.g. 20–40 μ g. to a patient already undergoing analysis. Following ingestion of the drug, the author stayed with his patient for a continuous period up to four hours in length recording the material and discussing it with the patient. A satisfactory elimination of the patient's fear of homosexuality was achieved. An earlier paper, by Busch and Johnson (1950) should again be quoted as our original work was partly inspired by their findings and also the more recent work of Katzenelbogen and Ai Ding Fang (1953) should be mentioned. In England, Ling (1955) has successfully used LSD for the treatment of the psychoneuroses, while Davies and Davies (1955) have used it as an aid to psychotherapy in mental defectives. Martin (1955) has reported excellent results in psychoneurotics treated as out-patients in a day hospital, controlling after-reactions with chlorpromazine and barbiturates.

TWO-YEAR FOLLOW-UP IN THE THIRTY-SIX PATIENTS REPORTED ON IN 1954

In 1954 we classified the results of treatment as "Recovered", "Greatly Improved", "Moderately Improved" and "Not Improved". These terms will now be defined and the definitions have been followed in assessing all the cases reported in this paper.

Recovered—Able to discontinue treatment and resume normal life at an equal or superior level to that attained before the illness began. The patient must be able to enjoy normal social relationships and family life and must be free of symptoms.

Greatly Improved—Able to discontinue treatment and to resume normal life, including return to full work. Some personality disorders permitted in this category which may result in an occasional return of symptoms which are not sufficiently severe to disturb social or family life.

Moderately Improved—Some dependence on psychiatric treatment but return to full work, possibly at a lower level than before illness. Some persistence or recurrence of symptoms permitted, which may disturb social or family relationships but not sufficiently to require readmission to hospital.

Not Improved—Symptoms remain as disabling as when the patient first attended clinic or hospital.

There is a fairly wide difference between the "Moderately Improved" and "Not Improved" categories, and in intermediate states patients have been placed in the "Not Improved" group.

The following table summarizes the present condition of the 36 patients reported on in 1954.

TABLE I

		Recovered	Greatly Improved	Moderately Improved	Not Improved	Total
Males	..	2	3	5	6	16
Females	..	2	5	2	5	14
						30
						Omitted from series (inadequate treatment and responded to other methods .. 1
						Inadequate follow-up.. .. 2
						Refused to continue after one treatment (but has now resumed) 1
						No reply to any follow-up 2
						36

It may be noted that whereas 21 patients were grouped in the "Improved" categories in 1954, 19 are now so assessed. This may be accepted as evidence of the relatively low relapse rate. It should be pointed out that 27 out of the original 36 patients required mental hospital in-patient treatment when we first saw them, and at the time of writing, as far as we are aware and excluding the 4 cases inadequately followed up, not one of these patients is in a mental hospital.

THE RESULTS OF TREATMENT IN THE NINETY-FOUR PATIENTS TREATED UP TO MARCH, 1956

These patients include 30 of the original 36 patients treated in 1953 and 1954 (Table I), excluding the 6 patients in whom the follow-up was unsatisfactory. This means that a further 64 patients were treated up to March, 1956, and these have now been followed up for at least six months to September, 1956. The results are given in the following table.

TABLE II
Results of Treatment in Whole Series

		Recovered	Greatly Improved	Moderately Improved	Not Improved	Total
Males	..	8	11	5	19	43
Females	..	13	9	15	13	50
						—
						93
Female	..	No reply to follow-up (recovered at time of discharge)				1
						—
						94
						—

TABLE III
Diagnosis and Results of Treatment in Whole Series

	Recovered	Greatly Improved	Moderately Improved	Not Improved	Total
Primary anxiety neurosis ..	8	6	3	5	22
Anxiety neurosis associated with alcoholism, schizoid or immature personality ..	2	3	—	6	11
Phobic anxiety	1	1	—	1	3
Anorexia nervosa	—	—	—	1	1
Obsessional neurosis ..	2	3	3	1	9
Hysteria (all forms) ..	1	2	4	5	12
Psychoneurotic depression ..	1	4	3	5	13
Sexual neurosis:					
Homosexuality	1	—	—	2	3
Transvestism	2	—	1	—	3
Impotence ..	1	—	2	3	6
Psychopathic personality ..	—	1	3	2	6
Convalescent schizophrenia	2	—	1	1	4
					—
					93
No reply to follow-up					1
					—
Total					94
					—

The follow-ups have been carried out at intervals of about six months since the completion of treatment. Wherever possible personal interview was relied upon and this was carried out in all cases except those that lived at a considerable distance from the hospital. The only patient who could not be traced had moved to Liverpool.

It will be noted that, out of 94 patients, 61, or 65 per cent., are recorded as recovered or improved. This compares favourably with other methods of treating the severe neuroses and we must again emphasize the fact that all our earlier cases and most of the later cases had failed to respond to conventional methods of therapy.

THE CAUSES OF FAILURE

In 1954 we thought that chronicity was an important factor in failure, although several cases were recorded in which a longstanding neurosis had improved. The following table analyses the possible causes of failure in the 32 cases recorded as "Not Improved".

TABLE IV
*Relationship between "Improved" and "Not Improved" groups
and accepted factors affecting recovery*

	Recovered and Improved Group	Not Improved
Duration of illness 10 or more years	15	9
Latent or actual psychosis	4	8
Hysterical illness	7	6
Inadequate personality	2	6
	Total	29

N.B.—The total number of "Not Improved" cases is 32. Three patients in this group do not belong to the four categories listed. Similarly, only 28 out of the 61 patients that recovered fall into these categories. Thus a much greater proportion of the "Not Improved" cases are associated with factors which are generally accepted as carrying a poor prognosis compared with the "Recovered" and "Improved" categories. Nevertheless, 28 patients with poor prognostic features were materially influenced by LSD treatment.

COMMENTS ON THE RESULTS

Therefore the outstanding causes of failure are the presence of actual or latent psychosis and "inadequate personality". The latter assessment is notoriously difficult to make, but we are now achieving more success in estimating personality traits by the use of a formal social history, details of which may be published later. We must stress the need for taking a very careful history before submitting patients to LSD treatment. In the various diagnostic groups the proportion of successes to failures is reasonably uniform. The surprising success in the psychopathic personalities must now be added to our continued success with the obsessional neurotics, as reported in the earlier paper. These two categories deserve special comment.

Psychopathic Personality

Of the many problems which beset the therapist in treating psychopaths, perhaps the most obvious is the patient's inability to identify himself with the aims of the therapist. He will frequently appear to take a great interest, for example, in group therapy, in which he will participate freely and often with apparent insight, saying that he is learning much about himself and his social shortcomings. But again and again, he relapses and fails to integrate anything he has learned. To lysergic acid, however, the attitude of the psychopath is different. We have found that our psychopaths do take this treatment seriously. The upsurge of inner psychological material compels these patients to do something about themselves and they develop an interest in the treatment which in itself overcomes their desire to satisfy their libido in antisocial ways. It is no doubt true that some natural maturation occurs in time in most psychopaths and LSD treatment appears to enhance rapidly this natural development of character without all the dangers of "learning the hard way".

It will be appropriate to mention at this point that it is not only in psychopaths that maturation and unfolding of the personality occurs during LSD treatment. In many of our patients we have observed changes of character in terms of increased drive and initiative, greater independence and a more mature outlook which occurred early in the treatment, often before symptoms began to be relieved. This was particularly noticeable in the sexual neuroses, which many would regard as forms of character disorder. We would therefore suggest the wider use of LSD in the treatment of psychopathic states and character disorders.

Obsessional Neurosis

Obsessional neurotics respond poorly to previous methods of treatment and as a result of their lack of response to psychotherapy, the tendency in recent years has been to treat them by electroplexy, insulin, leucotomy or by chemical shock as with acetyl choline. Each of these methods has met with some success, but the results are less good in patients with developed obsessive-compulsive syndromes. The psychotherapeutic problem seems to lie in the excessive psychological resistance encountered in these patients and therefore they appear ideally suited to LSD therapy. This is found to be the case. The obsessional neurotics in our series do manage to produce material other than their obsessions and progress can be made, although larger doses of LSD and more prolonged treatment is required than with other types of case.

Hand-washing obsessionals seem to respond particularly well to LSD as in their cases a well-marked sexual psychopathology is nearly always present; frequently the neurosis seems to have commenced with a definite incident of sexual trauma in childhood, the memory of which has been deeply repressed. In the authors' experience, LSD is the only drug which will bring this particular type of repressed memory into consciousness.

FURTHER OBSERVATIONS ON THE TECHNIQUE OF LSD TREATMENT

In our previous paper we described the technique which we were using at that time in some detail and included some notes on instructions which should be given to the nursing staff looking after the patient. Whilst our general instructions to nurses still hold good, there have been some alterations in the management of the patient, the most important of which is the use of drugs such as barbiturates and chlorpromazine to modify the LSD reaction. In the earlier stages of the clinical studies we avoided as far as possible using any other drugs as we wished to demonstrate that the LSD alone was responsible for the phenomena observed. We find now that the usefulness of LSD treatment can be increased by the use of these drugs.

It has been found that LSD has two great disadvantages; it may cause excessive anxiety and it is liable to produce a repetition of the acute phase of the experience days or even weeks after the initial doses. It is probable that repeated and larger doses of LSD produce the most severe and prolonged after-effects, but we have seen this phenomenon well marked in patients who have had no more than 50 μ g. weekly. One patient who had sixteen doses, the maximum of which was 150 μ g. reports that she still has an occasional return of the LSD phenomena more than two years after cessation of treatment. The use of auxiliary drugs is therefore directed towards two ends. The first is to reduce the length of the psychic disturbances which occur on the day of

administration of LSD and to diminish the anxiety resulting. This is best accomplished by a short-acting barbiturate such as pentobarbitone given orally in doses up to $4\frac{1}{2}$ gr. (0.3 g.) three to six hours after the administration of LSD and if necessary six hours later. Second, drugs are given to avoid repetitions of LSD experiences, which may occur some hours or days after the treatment. For this purpose we have used chlorpromazine tablets, 25–50 mg. three times a day, and more recently Frenquel, but the value of this latter drug is still in doubt. The chlorpromazine is usually given for 5 days after treatment and is stopped on the day preceding the next treatment. These techniques have made it possible to treat a larger number of patients without admission to hospital than we hitherto thought possible. We still, however, feel that it should be possible to admit any patient undergoing LSD treatment to a hospital bed under observation for at least a night if the occasion should arise.

We have referred above to excessive anxiety as one of the by-products of LSD treatment. In cases of anxiety neurosis the symptoms may therefore become considerably worse under treatment, and the patient may become actively suicidal. This should not necessarily be taken as an indication to stop the treatment provided that useful psychological material is emerging. In our experience, marked suicidal urges have particularly occurred during the treatment of anxiety neurosis, and are not necessarily confined to patients who had depressive or suicidal ideas before treatment was commenced. One patient attempted to strangle herself at the height of the LSD reaction, whilst three others have expressed urgent wishes to be allowed to go and throw themselves in the nearby river, and had to be restrained from so doing. By "restraint", we mean moral persuasion rather than physical restraint, and patients in this condition can usually be persuaded to take pentobarbitone, after which the suicidal tendencies subside and are not necessarily present between treatments.

In our previous paper, we mentioned the possibility of precipitating a psychosis as an important complication of treatment. Now that we have treated a large number of patients of diverse types we feel that this risk has been over-emphasized. We believe now that among the risks of treatment, the emphasis should be shifted to the possibility of suicide.

Smaller differences in technique consist of a fairly rigid adherence to once weekly treatment, the use of somewhat smaller doses than hitherto (50–200 μ g.), and where possible, an intensification of the psychotherapy which forms of course the essential basis of the treatment. We have had experience with a small number of cases in which LSD was given at weekly intervals with the minimum of supervision by the therapist. Most of these patients produced a great deal of material which they wrote down but which they failed to integrate and the results were poor. We can therefore favour a plan of treatment which does not extend beyond four months. This allows about two weeks of initial interviews, eight or ten weeks for the active treatment of the patient with LSD, and during the remaining time the patient's material is the subject of further observation and analysis. In some cases, the psychotherapy and self-analysis may have to be extended for a longer period. Apart from a few exceptional cases in which it becomes clear at the end of the four months that there is no alternative to a full-scale psychological analysis with or without LSD, most of those patients who had not improved after four months' intensive treatment are not likely to benefit. Exceptions to this rule do, of course, occur but no definite guidance can be given for their selection, as the judgment of the clinician must be used in each case.

LSD AND CHLORPROMAZINE IN COMBINATION
A SPECIAL TECHNIQUE FOR THE TREATMENT OF
PSYCHOTIC PATIENTS

It has been generally conceded that LSD has little therapeutic influence on psychotic patients and that its effect is to accentuate existing psychotic symptoms. The work of Denber (1955) has drawn attention to the possibility of the use of mescaline modified by a single dose of chlorpromazine in the treatment of schizophrenia. This worker administered 0.5 g. of mescaline sulphate intravenously followed 1 to 1½ hours later by 50 mg. of chlorpromazine hydrochloride intramuscularly. This treatment was given to 57 psychotic patients, on one occasion only to 27 patients and between 1 and 16 occasions to the remainder. Forty of the patients were suffering from an acute psychotic illness and 18 of these showed a complete remission, and 7 showed a partial improvement, while only 7 of 17 chronically ill patients showed any improvement at all. The patients in this series are reported to have produced much psychological material during the mescaline stage of the treatment which was discussed therapeutically in the state of relaxation later induced by the chlorpromazine. The results of this investigation were sufficiently interesting to prompt us to treat psychotics by a similar technique using an LSD-chlorpromazine combination.

We felt that the efficacy of such a method would be difficult to assess in acute psychotics, of whom approximately 40 per cent. remit spontaneously and in whom the effects of the chlorpromazine and psychotherapy alone would be difficult to discount. We therefore selected 10 psychotic patients of various diagnostic groups with well-preserved personalities who had been ill and confined to hospital for 1 to 2 years and in whom other methods of treatment had failed. The series of 14 patients was completed by 4 schizophrenic patients who had been ill for more than 2 years with reasonably well-preserved personalities. These patients were given 50–100 µg. LSD in the morning and precisely 2 hours later received 50 mg. chlorpromazine intramuscularly. This treatment was repeated weekly and an average of 5 treatments was given to each patient. During both phases of treatment the physician spent some time with the patient, recording material, but this was only rarely interpreted. The most striking result of the LSD phase was the increased emotional facility of the patients, often with outbursts of weeping and evident anxiety, which were not normally encountered. Many of the patients became more emotional and aggressive following treatment and the aggressive behaviour lasted several weeks and required additional chlorpromazine to control it in 2 patients. This increase in aggressive behaviour was regarded as a favourable prognostic sign and did not occur in those who failed to get well.

SUMMARY OF TREATMENT BEFORE GIVING LSD-CHLORPROMAZINE

Two patients had E.C.T. only before treatment, 7 patients E.C.T. and deep insulin treatment, 2 E.C.T. and prefrontal leucotomy, and 1 E.C.T., insulin and leucotomy, whilst 2 received E.C.T. and chlorpromazine.

Table V shows the results in the different diagnostic groups.

All of the patients regarded as recovered or improved were able to leave hospital and are making satisfactory social adjustments. Of the failures, 4 were able to leave hospital for a few months, but relapsed and had to return. These patients have now been followed up for periods varying from 5 to 12 months. Beyond noting that some of the recoveries were dramatic and unexpected, the

TABLE V

Results of LSD-chlorpromazine Treatment

This table shows the results in the different diagnostic groups

	Recovered or Much Improved	Not Improved
Schizophrenia, all types, duration 1 to 2 years	3	1
Chronic schizophrenia, duration over 2 years	nil	4
Paraphrenia, duration 1 to 2 years	2	1
Endogenous depression, duration 1 to 2 years	1	1
Recurrent stupor, (?) psychotic, 1 year in hospital	1	nil
	7	7

authors prefer at this stage to avoid elaborating the results until more material has been collected. Larger follow-up studies may provide a suitable basis for a later communication.

THE PRESENT POSITION OF LSD IN RELATION TO PSYCHIATRY

Our clinical investigations during the past 3 years have convinced us that lysergic acid diethylamide produces psychological changes in sufferers from neurotic illnesses which can be used by the therapist to assist the patient to come to terms with the psychological problems and thus achieve a cure. It has become increasingly clear that the ingestion of LSD produces two types of reaction in the organism. The first, which occurs soon after the ingestion of the drug, consists chiefly of vegetative disturbances, characterized by variable disturbances of both sympathetic and parasympathetic systems, chiefly the latter. The second type of reaction occurs later, 1½ to 2 hours after ingestion and is characterized by "psychic" disturbances, when, for example, alterations of perception and awareness of the outer world are combined with psychological experiences of the deepest significance to the patient. These frequently involve the recovery of emotionally charged memories. It seems likely that the vegetative experiences are frequently accompanied by so-called toxic manifestations involving confused and sometimes bizarre alterations of the body image and of external objects. We believe that these vegetative and toxic changes are the ones that have been most frequently described by investigators working with normal volunteers. Our experience has been that during the first few treatments patients have chiefly experienced these vegetative symptoms to the exclusion of the psychological material which becomes predominant during later treatments. Patients who have had a number of treatments cease to be worried by the earlier "toxic" symptoms and seldom refer to them.

The nature of these later changes which are made use of by the therapist is still far from clear. That they involve the central autonomic nervous system and the mechanism of memory recall are made clear by the clinical material. On the question of memory, it seems that the problem of the human brain in this respect is not so much the storage of memory but its recall. Psycho-analytical theory suggests that human consciousness exists partly as a result of repressing memories and that memories charged with unpleasant emotional material become more easily repressed than others by predisposed subjects. The mechanism by which LSD produces memory recall and emotional release are

likewise obscure. It is tempting to compare some of the LSD manifestations with the temporal lobe syndrome, characterized by dreamy states, alterations of space and time perception, disturbances of body image, *déjà vu* phenomena and the vivid recall of earlier memories.

In an earlier paper (1954) one of us suggested that the recall of memory might go beyond the frontiers of personal memories and extend into racial or archetypal experiences which have been described by Jung as the racial or inherited memory. There is much experimental work to support this and Aldous Huxley (1954) also gives the notion credence in his work on mescaline. No further theoretical implications of this can be deduced at present, and in practice the archetypal experiences are more material for the analyst if he be minded to use it.

The picture would become clearer if we knew more about the fate of LSD after its ingestion in the body. Lanz, Cerletti and Rothlin (1955) have established that, in the mouse, the half-life time of LSD in the blood is 37 minutes, measured by testing the antagonism of LSD to serotonin on the isolated rat uterus. These authors also attempted to determine the distribution of LSD in the organism. The findings showed that LSD administered intravenously disappeared relatively rapidly from the blood and its presence could be detected in various organs such as the brain, liver and striated muscle. Stoll, Rothlin and Rutschmann (1955) have investigated the distribution and fate of carbon-labelled LSD in the animal body. They conclude that the greater part of the LSD undergoes chemical alteration and is excreted within a relatively short time via the liver and bile into the small intestine, and that, in contrast to LSD itself, the metabolites are water soluble. The LSD content of the liver is especially high, and the ratio for LSD in hepatic tissue and blood remains constant. Independently of the blood level, the LSD content of the brain, however, diminishes more rapidly. These findings, if applied to man, are of considerable significance because the intravenous injection of LSD does not produce any symptoms for 20 to 30 minutes, while the psychic symptoms are not fully developed for two or three hours. Assuming that LSD disappears rapidly from the brain and blood stream the late onset of the symptoms is difficult to explain and LSD phenomena occurring days or weeks after the initial dose are even more difficult to account for unless one postulates the production of a second substance. The nature of this secondary substance cannot be determined as yet, but it is tempting to suggest that LSD, effective as it is in extremely small doses, may initiate biochemical changes in the body which are unknown and which continue for at least some hours.

While further research is called for in the fields of psychology and therapeutics, LSD must also be considered in relation to the problem of schizophrenia. In simple terms, attempts have been made for many years to discover a biochemical basis for schizophrenia. The belief that one single metabolic disorder leading to an over-production of an alien substance may be the cause of this psychosis continues to attract many workers. This theory is given strength by the similarity of the symptoms of a number of drug intoxications, including LSD, to genuine schizophrenia. Thus Fabing (1955) produced evidence that α (4-piperidyl) benzhydrol hydrochloride (Frenquel) blocked a schizophrenic dissociation state induced by LSD in a volunteer subject without blocking the viscerosympathetic components of the LSD reaction. He further claims that this compound has demonstrated interesting, though inconsistent, therapeutic properties in some schizophrenic dissociation syndromes. Similarly, serotonin metabolism has been invoked in support of the same theory in view of its

possible antagonism to LSD, as Woolley and Shaw (1954) have suggested. These authors believe that serotonin probably plays a role in maintaining normal mental processes; that metabolically induced deficiency of serotonin may contribute to the production of some mental disorders and that serotonin or a long-acting derivative of it may prove capable of alleviating disorders similar to schizophrenia. Montanari and Tonini (1955) have reported that two schizophrenic patients improved after treatment with serotonin, after chlorpromazine had failed to bring about a remission.

Our own limited experience with both Frenquel and serotonin has not led us to believe that acute hallucinatory psychoses in the schizophrenic group are materially affected by these drugs, but more work is needed to make any positive assertion on this point. In fact, one schizophrenic patient became more hallucinated after he had been given intramuscular serotonin. It is, however, necessary to explain why other substances which antagonize serotonin, such as Brom-LSD, are psychologically inert. (Cf. Cerletti and Rothlin (1955).) Some of our patients who had already taken LSD were given Brom-LSD some weeks later without any psychological changes occurring, whilst others who had never had LSD also experienced no change after taking Brom-LSD.

We therefore believe that there are many objections to a relatively simple biochemical explanation for schizophrenia, whilst on the other hand, there are undoubted links between the research work now going on in the field of LSD and allied drugs and their antagonists which promises exciting developments in the future. There is a great need for continued therapeutic research in this field.

SUMMARY

1. This paper presents an extension of the studies reported by the authors in 1954 which demonstrated the value of lysergic acid diethylamide in the treatment of mental illness. The 36 patients have been followed up for a further 2 years and the results are given. A further 64 patients have been treated since 1954 making a total of 100 in all. Of these 100 patients, 61 have recovered or improved, 32 failed to derive appreciable benefit and 7 were not assessed for reasons which are given. A wide variety of neurotic conditions were treated.

2. The significance of these results is discussed and the causes of failure are commented upon.

3. Special mention is made of the results in psychopathic personalities and obsessional neurosis.

4. A new technique for the treatment of psychotic illness, mostly schizophrenia, by means of an LSD-chlorpromazine combination is discussed. The results are given in 14 cases. This method shows encouraging results in well-preserved schizophrenics of one to two years' duration that had not responded to orthodox methods of treatment.

5. The position occupied by LSD in relation to therapeutics and biochemical research in psychiatry is examined.

6. The opinion is expressed that LSD treatment continues to be of the utmost value in psychotherapy, both in cases otherwise resistant to treatment and as a method of avoiding the prolonged time necessary for a full psychological analysis.

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PLACEBOS AND THEIR PSYCHOLOGICAL EFFECTS

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ALTHOUGH numerous instances of the surprising efficacy of placebos in a wide variety of conditions have been reported lately, little has yet been done towards providing an explanation of the occurrence of placebo reactions in terms of psychology. In what follows, the main findings concerning placebos will first be described, and then an attempt made to relate them to psychological theory. Even if this attempt is premature, it may succeed in showing the need for further work and in suggesting what directions this might take.

A placebo may be defined as "An inactive substance or preparation formerly given to please or gratify a patient, now also used in controlled studies to determine the efficacy of medicinal substances" (Dorland, 1951). In the latter sense it is sometimes termed "dummy" treatment (Gaddum, 1954). Such agents have probably been investigated more than any actual drug, as most psychological studies on drug effects have, for many years, made this concession, at least, towards scientific method: yet it is only recently that much attention has been focussed on them. When administered according to the "double-blind" method, their function is to prevent either the subject or the experimenter from knowing when the active drug is being given, so they cannot be disregarded even in experiments on animals. But in man they are of greater significance owing to the frequency of placebo reactions. The more ineffective the drug under investigation is, the more important is a knowledge of these placebo reactions for assessing its effect. Thus in psychological and psychiatric work placebos are of considerable importance, whereas they may be disregarded in, for example, a study of a new anaesthetic.

I. MATERIA MEDICA OF PLACEBOS

Placebos are usually inert substances, administered in the same manner as the drug under investigation, e.g. sterile water or saline for injection or a capsule of lactose, but sometimes potentially active substances are used in small quantities, especially the bitter-tasting alkaloids such as quinine which was used in the M.R.C. research on cold cures (1950) and strychnine which is still used in "tonics" (although in the usual doses it is without effect and in larger doses the effects would be highly undesirable according to Goodman and Gilman, 1955). For medical purposes, it has been recommended that they should be red, yellow or brown in colour, bitter in flavour and either very large or very small in size. The appearance should not resemble that of aspirin (Leslie, 1954). The colour preference may be very specific; a colleague reports that a certain patient can only sleep if given a *yellow* placebo capsule, the red and white being quite ineffective. For a liquid placebo Leslie (1954) recommends a 0.1 per cent. solution of sodium dehydrocholate as being more readily available than the once extensively used tincture of valerian. An ideal placebo would have all the inessential properties of the drug with which it was to be compared and not merely resemble it in colour and taste. Too often the active preparation makes itself known by obvious effects which are only incidental to the one under

investigation, and changing the code is not an entirely adequate subterfuge. Baker and Thorpe (1956) have enlarged on these difficulties, as a result of their surprising findings that placebo administration led to some highly significant reductions in daytime incontinence in deteriorated psychotic patients, whereas "Pacatal", "a new and superior tranquillizer" (to quote the manufacturers' description) produced no significant changes in this respect. They "believe that there is at least one simple explanation for this unexpected result. Although the tablets are similar in appearance, if they are tasted the inert one is sweet. Thus, in terms of total experience, one control group received several small sweets daily from the nurses whilst the other group received a bitter pill. As shown by Merry (1956) and others, small changes which improve the personal relationship between the nurse and patient will lead to improvement in the behaviour of the latter." Among the difficulties mentioned, they point out that "any attempt to observe a form of behaviour in our patients has often led to a change in that form of behaviour", also that "the subjective experiences of patients taking the tablets may differ", that the nursing staff inevitably try to find out which the inert tablet is and "this knowledge (accurate or inaccurate) may influence their attitudes to the patients under investigation. The patients receiving one form of drug may then receive different nursing care from those receiving the other." Finally, the "double-blind" technique is made difficult with tranquillizers because of the association of Parkinsonism with reserpine, of facial pallor with chlorpromazine and of dryness of the mouth with "Pacatal". They discuss certain ways of avoiding these errors, whose prevalence is so great that little confidence can justifiably be placed on the results of initial trials with drugs.

II. PLACEBO REACTIONS: SOME EXAMPLES

Reactions to placebos are seldom striking and rarely, if ever, lethal, but they are not confined to reports of vague subjective changes. They may involve almost every organ and system in the body, and a selective list of their desirable apparent effects would resemble a pharmaceutical advertisement. Beecher (1955) has compared the incidence of relief by placebos in fifteen studies, of the kind mentioned here, in over 1,000 patients. He found that this ranged from 15 to 58 per cent., with an average of 35.2 ± 2.2 per cent. relieved. The following is only a small sample of the responses reported following administration of placebos.

They may be associated with gastric changes like those caused by urogastrone and prostigmine (Wolf, 1950). In the form of a saline injection a placebo not only greatly reduced the number of attacks in a third of the asthma patients in whom it was tried but, as an intravenous infusion, benefited patients with adrenaline-resistant status asthmaticus (Wayne, 1956). It may be of benefit in hay-fever (Baldwin, 1954), and it was also as effective for suppressing cough as an injection of gr. 3 of codeine (Hillis, 1952). As a tablet, it benefited patients with tension symptoms as effectively as mephenesin (Wolf and Pinsky, 1954). In fact, Hampson *et al.* (1954) even found that "the decline in severity of symptoms was greater when patients were taking placebo than when they were taking 3 G. mephenesin per day", although the difference was not statistically significant. It has been found to be an efficacious treatment for 52 per cent. of headaches, although some patients are unaffected (Jellinek, 1946). In intermittent claudication injections of sterile saline improved the exercise tolerance more than did tolazoline ("Priscol") a vasodilator (Hamilton and Wilson, 1952). In 14 per cent. of the 69 patients with post-operative pain who received two or

more doses of a placebo, Lasagna *et al.* (1954) found the pain to be consistently alleviated. Euphoria may follow its injection, particularly in subjects who respond atypically to other drugs (Lasagna *et al.*, 1955). For treating the common cold it was as effective as certain antihistamines, e.g. thonzylamine (M.R.C., 1950) or cold vaccines (Diehl *et al.*, 1940), but in this connection seems particularly liable to be associated with the occurrence of drowsiness, lassitude, listlessness, dizziness, giddiness, vertigo, headache, depression, insomnia and gastro-intestinal disturbances (M.R.C., 1950). Beecher (1955) reports thirty-five different toxic effects of placebos. Among the more severe reactions to be reported are dermatitis medicamentosa and angioneurotic oedema (Wolf and Pinsky, 1954).

In psychiatry, administered as compressed air, it rivalled carbon dioxide in its efficacy, 50 per cent. of the patients improving (Hawkings and Tibbetts, 1956b) and, as an injection of sterile water, it rivalled acetylcholine therapy, with 60 per cent. improving (Hawkings and Tibbetts, 1956a). According to the circumstances, placebos may appear to have stimulant (Flory and Gilbert, 1943) or depressant properties (Straus *et al.*, 1955). There may, however, be undesirable side effects: in fatigued subjects hallucinations have followed their administration (Tyler, 1947). Dependence and, in a sense, even "addiction" may develop. A case has been reported of persistent pain following the amputation of a limb, which was relieved only as long as frequent injections of saline were given. And in morphine addicts, saline has eventually been substituted for the drug without withdrawal symptoms appearing until the saline injections were stopped (Leslie, 1954).

As Steinberg (1956) points out, "the placebo symptoms often resemble those which would be expected from the drug under investigation. This may be partly the result of the way in which the reports of symptoms are elicited", but it may happen spontaneously if the subjects know or suspect what the drug is under investigation. Abramson *et al.* (1955) in their studies of lysergic acid diethylamide found that certain subjects gave positive responses after the administration of tap water, and they criticize much of the previous work on the grounds that "the use of controls given zero dosage was not perhaps as adequate as desirable". (On the other hand, their own work may be criticized because they administered the drug in tap water which often contains substances which inactivate the drug. This may have resulted in diminishing the difference between the control and the drug groups.)

III. PLACEBO REACTIONS: THEIR SIGNIFICANCE, CONSISTENCY AND RELATION TO PERSONALITY

So far the personality of the placebo-reactor has not been subjected to much study, nor is it known how generalized or consistent this tendency to react is. Jellinek (1946) in his study of the comparative effectiveness of analgesic agents found an "example of the rare U-shaped distribution . . . Thus there are individuals who definitely tend to respond and individuals who definitely do not tend to respond to placebo" (cf. Lasagna *et al.*, 1954, see below). He goes on to say that this difference must reflect a difference in the nature of headaches, although this does not necessarily follow. He suggests that placebo-reactors should be screened out. "Banal as it may sound, discrimination among remedies for pain can only be made by subjects who have a pain on which the analgesic action can be tested. The imagined pain, the psychological headache, may be a source of great discomfort to the subject, but it does not form the prerequisite condition for drug discrimination."

Similarly, Beecher *et al.* (1953) in a comparative study of morphine, codeine and a placebo, all given orally, found that if the placebo reactors were excluded it became "possible to demonstrate significance where it had not been possible to do so before". If the grand total percentage relief from aspirin is compared "with the grand total relief from combined morphine-codeine . . . we would find 52 per cent. relief out of 131 doses of 'aspirin' and 40 per cent. relief out of 116 doses of morphine and codeine. The difference between 52 per cent. and 40 per cent. gives only a 6 per cent. level of significance. This comparison is not as well controlled as a comparison taking account of the fact that there may be differential percentages of patients relieved by placebos in the two drug groups." These differences were not, however, significant. Nevertheless, the presence of the placebo-reactors obscured the influences of the drugs. "Among placebo reactors there is little or no difference between percentages relieved by the drugs", whereas "among placebo non-reactors there is a significant difference between percentage relief in the combined acetylsalicylic acid groups and percentage relief in the combined codeine-morphine groups".

Placebo reactions in one particular situation have been investigated by Lasagna *et al.* (1954) who have also tried to compare the personalities of those whose post-operative pain was consistently alleviated by saline injections with those whose pain was consistently unaffected thereby. The group studied consisted of 162 post-operative patients who had required morphine or a similar narcotic to be prescribed for their pain. In phase 1 of the study there was one injection of saline to every five of morphine, and in phase 2 the placebo was given alternately with the morphine. "A medication was considered to have produced relief when the patient indicated sufficient alleviation of pain ('over 50 per cent.') at forty-five and again at ninety minutes after injection . . . and for every placebo dose which produced relief it was required that pain return, to eliminate the possibility that the pain had subsided spontaneously."

They found that there was a significantly higher incidence of relief from morphine in the placebo reactors than in the non-reactors. "Less than half of the patients who received multiple doses of a placebo responded consistently to the placebo. Those requiring more frequent treatment for their pain were less affected both by morphine and the placebo. Of 69 patients who received two or more doses of the placebo, 55 per cent. were inconsistent, the placebo only sometimes being followed by relief. 14 per cent. consistently reacted favourably to the placebo, as compared with 31 per cent. who did not."

Possibly the consistent reactors represent the two extremes of a personality continuum, with the majority falling in between, as with so many other psychological traits. But the low degree of consistency even under the carefully controlled conditions of the experiment suggests that it might be difficult to obtain any consistent reactions at all if subjects were compared in several different situations. The specificity or generality of the placebo reactions might well be determined before attempting to correlate the supposed trait with types of personality. It is possible that the patients who obligingly improve on a placebo are not the same as those who contrive to develop those curious and sometimes even alarming symptoms which have sometimes been reported to occur.

In the study by Lasagna *et al.*, psychological data on the consistent reactors and consistent non-reactors were obtained, by interviews, questionnaires filled in by nurses on surgical wards, the Wechsler-Bellevue vocabulary sub-test, and lastly (and according to some authorities, least), the Rorschach. The tests were all done at the end of the patients' stay in hospital, and the interviews and questionnaire earlier in their stay.

Compared with the 16 consistent non-reactors, the 11 consistent reactors were on an average 5 years older and their pain relief with morphine was greater than in the non-reactors who appear to have had more persistent pain, although the type and extent of the major surgery undergone by the two groups was similar. "The reactors all considered the hospital care 'wonderful', whereas only four of the sixteen non-reactors felt this way." Whether this difference in attitudes resulted from an actual difference in the amount of pain endured, with or without medication (a favourable attitude could easily be developed towards those who were instrumental in reducing pain and anxiety) or whether the attitudes had been previously established is crucial, but uncertain. Possibly the "reactors" did enter the hospital more prepared and more able to tolerate pain uncomplainingly. It is curious that although over half of the non-reactors were reported not to attend churches, "Every placebo reactor in this group was a veritable pillar of the church, attending services with regularity and being greatly interested and active in church affairs" (Lasagna, 1955). The churches presumably represent forms of Christianity, which is apt to foster, at least in theory, a peculiar and "unbiological" attitude of acceptance of pain and suffering. In accordance with this, 72 per cent. of them were said to minimize their post-operative pain compared with 19 per cent. of the non-reactors. Thus Lasagna *et al.* appear to depend for their measurement of pain in the placebo reactors upon the complaints of those who, both in theory and in practice, are relatively uncomplaining. Without even fuller details than are given, such as the circumstances deciding the injection schedule in a given patient, it is difficult to assess just how serious this objection is. In further support of it, the reactors asked for medication less frequently, were more co-operative, and had had less formal education. On the other hand, they seemed to the nurses to have less severe pain (but the nurses could only observe the overt reactions to the pain, which would, of course, be less according to the view put forward here); they gave a history of more somatic symptoms under stress, a greater tendency to use aspirin and cathartics, and at the interview they were more "weepy" (but also more talkative). The *P.* of these differences ranges from $> \cdot 10$ to $\cdot 001$. It would be of interest to know how frequently the injections of morphine and of the placebo were accompanied by nausea; if the incidence should prove higher in the non-reactor group, this would support the interpretation given above.

The Rorschach data differentiated the groups in certain ways. For instance, the reactors gave more responses, especially relating to "insides". They were also considered on the basis of the Rorschach interpretation to be less mature and "more dependent on outside stimulation than on their own mental processes" and, although more anxious and dependent than the non-reactors, they were less rigid and more able to cope with these drives.

This interesting article has been discussed at some length because although frequently quoted, it has not received any critical assessment. Besides those already mentioned, the study has several other limitations:

1. Placebo reactions were only investigated in one type of situation.
2. There was no objective measure of the drug effect or of the pain, which was presumably altering daily.
3. The psychological investigations were done while the patients were convalescent, when those (like the non-reactors) who may have suffered more actual severe and prolonged pain, may well have not fully returned to their normal psychological state.
4. (a) The assessment of personality was inadequate. No evidence is

given on the reliability or validity of the questionnaire, and there is good reason to suspect the quality of the psychological data collected by the surgical nurses.

(b) Although the Rorschach appears to differentiate the two groups significantly in certain ways (see, however, Cronbach, 1949), the composite portrait of the placebo reactors and non-reactors based on it is more questionable. According to Eysenck (1956a) when "used as a 'global' test of personality, subjectively interpreted and evaluated . . . it appears to be almost entirely useless, and the experimental literature leaves little doubt that validation studies of the test used in this fashion nearly always give negative results", although it may have some validity as a psychometric test objectively scored. "The variable having the highest saturation on the introverted side" in a study reported by Eysenck (1956b) is M per cent. Unfortunately Lasagna *et al.* do not mention this, nor the D score which is also said to be correlated with extraversion. However, a high $FM \div M$ score was found to have a saturation of .50 on a factor identified as extraversion; it also occurred in twice as high a proportion of reactions ($P = .06$). On the other hand a high F per cent. (average) which also had a loading on extraversion, was found in the non-reactors. Whether any conclusions can yet be safely inferred from the Rorschach procedure remains doubtful.

5. The method of repeated administration of placebos, quite apart from the discomfort to the patient who may not get the rest he requires, may have the disadvantage of extinguishing the placebo reactions, especially when opportunity is given for comparison with an effective drug, and discrimination is learned (cf. Glaser and Whittow, 1953, see below).

Until further studies have been carried out which avoid these limitations, it is difficult to know how general the findings of Lasagna and his colleagues are. One conclusion at least may be of importance, namely, that a classification into placebo "reactors" and "non-reactors" cannot be based on a single dose of placebo. This will inevitably make research into placebo reactions more complicated, but perhaps less misleading. Presumably on the basis of a single test, Straus *et al.* (1955) excluded "all known placebo reactors" in their study of the hypnotic effects of an antihistamine, but even then "over 30 per cent. of the patients scored the placebo as excellent in inducing and maintaining sleep".

IV. PSYCHOLOGICAL ASPECTS OF THE PLACEBO REACTION

In their recent study of placebo responses, Tibbetts and Hawkings (1956) attempted to link up their findings with personality theory. If it may be assumed that the tendency to react to placebos is a fairly unitary trait, their discussion is of some interest. They characterized placebo reactors (who were younger than the non-reactors, in contrast to those of Lasagna *et al.*), as less likely to have a history of previous neurotic traits or to have a hysterical or inadequate personality, but more likely to have "unelaborated anxiety".* They state that their findings concerning the lack of relation of the placebo reaction to hysterical conversion are "at variance with popular belief", but they assume "that the placebo reaction must be a manifestation of suggestion" and attempt to relate this to Eysenck's (1947) analysis of suggestibility. Eysenck "describes two quite uncorrelated and independent factors operating in the tests customarily used; primary suggestibility which concerns the suggestion of movements and secon-

* Beecher has recently presented evidence "that placebos are increasingly effective with increased stress" (*Amer. J. Physiol.*, 1956, **187**, 163-9). If this is so, it helps to explain the greater incidence of placebo reactions in clinical rather than experimental situations.

dary suggestibility which concerns the suggestion to sensations or perceptions". Neither type of suggestibility is specifically related to hysteria, although primary suggestibility and neuroticism are related. "To explain his data Eysenck invokes the concepts of aptitude and attitude. In the case of primary suggestibility aptitude is the tendency for the thought of a movement to be accompanied by an incipient movement of the muscles involved. In practice this aptitude is influenced by attitude, the desire of the subject to resist or not to resist the suggestion." Tibbetts and Hawkings consider that it is the attitude which is important clinically, and that it is "possible that a positive attitude towards symptomatic improvement may more usually be associated with dysthymia than with hysterical illness, since in the latter powerful motives of secondary gain militate against progress".

This explanation is plausible but has some defects. If placebo reactions are manifestations of primary suggestibility, which is closely related to neuroticism (Eysenck, 1947), it would be expected that hysterics would differ from the normal in the same direction as dysthmics, although possibly to a lesser degree.

It appears more likely that *secondary* rather than primary suggestibility is the trait related to placebo reactions in so far as these are not learned. Primary suggestibility is related to movements, whereas "the main feature in the tests which go to define this trait (of secondary suggestibility) is the experience on the part of the subject of a sensation or perception consequent upon the direct or implied suggestion by the experimenter that such an experience will take place, in the absence of any objective basis for the sensation or perception" (Eysenck, 1947). This might almost be taken as a definition of a placebo reaction. It should be relatively simple to test this theory. As yet, only one study appears to have been carried out which is relevant to it. Grimes (1948) included a "placebo" test in a battery of tests of suggestibility, as a test of prestige suggestibility. Unfortunately, its test-retest reliability was low (.433) and its correlations with the other tests insignificant, so it is difficult to draw any conclusions.

Secondary suggestibility has not been related to any personality dimension. The aptitude for it may be affected by the attitude as Eysenck (1947) found with primary suggestibility and this could account for an initial difference in response between co-operative dysthmics and actively indifferent hysterics. Probably, however, the learned component of the response is important. Discussing the responses of addicts to drugs Lasagna *et al.* (1955) write: "An important factor that may overlay many responses is the long-term conditioning that usually begins before the first experience with narcotics." To this is added the effects of the desires and expectations evoked by the specific situation, which may even be so great as to counteract the influence of the drug. For example, Wolf (1950) administered a drug to a woman with hyperemesis gravidarum who was led to believe that her vomiting would thereby be relieved; it was, and the contractions of the stomach were also inhibited for a time. The drug, however, was ipecacuanha, which, in larger doses, is a powerful emetic. An additional factor affecting the subject's reactions is the reinforcement given by the doctor or experimenter, consciously or unconsciously, to certain responses (cf. Verplanck, 1955).

When repeated doses of a drug and/or a placebo are given the effects of learning and discrimination would be expected to become more pronounced. Glaser and Whittow (1954) found that subjects receiving placebos reported more symptoms if they had been given a drug (1-hyoscine hydrobromide) of similar appearance a few days previously, than if they had not received any

previous medication. In succeeding tests, the incidence of symptoms reported after placebos declines. Even filling in questionnaires "can give rise to apparent responses in man", but when the procedure is repeated at intervals of 2-7 days, the responses become progressively less, until they reach a steady level. If a drug, indistinguishable from the placebo, is now given, it appears to have an "inhibiting effect on whatever habituation may have been acquired", because in the following test (when dummies were given again) more symptoms were recorded than before the drug had been taken (Glaser and Whittow, 1953*a* and *b*). These findings, based on a large number of subjects, were statistically significant.

A tentative explanation of these findings may be given in terms of learning theory. The initial responses to the placebo-questionnaire situation may be regarded as the result of generalization from other learning situations; the diminution of responses to this situation on repetition, as the result of lack of reinforcement; and the increase in responses to the placebo-questionnaire situation after a drug has been given, as the result of disinhibition.

Although the individual differences in these responses have not been related to personality, if the above elementary interpretation in terms of learning theory is tenable, there is at once a hypothetical link with personality theory. According to Eysenck's (1955) theory concerning the basis of differences between introverts (and dysthymics) and extraverts (and hysterics), it would follow that the introvert would tend to acquire placebo responses more readily and to lose them less readily than the extravert. Evidence for the implications of Eysenck's theory concerning personality differences in conditionability has been obtained by Franks (e.g. 1956). An alternative theory, associated with Spence and his co-workers, relates anxiety to ease of conditioning. Either theory is compatible with the few data that there are on placebo-reactors.

V. SOME IMPLICATIONS OF PLACEBO EFFECTS

The clinical and ethical problems raised in this connection are fortunately beyond the scope of this article. Cabot (1906) wrote: "Every placebo is a lie, and in the long run the lie is found out." Similar views are commonly expressed, e.g. "The placebo is a form of deceit, initially of the patient, ultimately of the doctor" (Handfield-Jones, 1953). The demarcation between suggestion and deceit is not very clear, even in the light of Leslie's (1954) distinction between deception and deceit. The therapeutic effects appear to be enhanced if the physician is, like the patient, unaware that the substance is acting as a placebo. Likewise, "it is hard for a team to maintain its enthusiasm about the use of an inert substance . . . and it may well be that enthusiasm is one of the more effective ingredients of the therapeutic situation" (Tibbetts and Hawkins, 1956). As Wayne puts it: "It is very easy to transmit one's own faith to the patient and so achieve a positive result with inactive substances. This partly explains the well-known phase of initial enthusiasm for a new remedy which led Osler to say 'use new remedies while they continue to act'" (Wayne, 1956).

The mere fact of administering something, even if it is only acting as a placebo, is satisfying alike to the patient and the doctor. Tibbetts and Hawkins (1956) point out that the attitudes of relatives of the patient with a psychiatric disturbance may change in a direction more likely to promote recovery if they learn that the patient is receiving physical treatment rather than treatment by "talking" which they would regard as confirmation of their suspicion that

the symptoms were "imaginary".* In addition to the effects on the patient and his relatives, there is the important but often unacknowledged influence on the doctor, who may be better able to preserve his own morale if he can prescribe something, even though its pharmacological effectiveness in this connection is not established. To be able to predict which patients would be unlikely to respond favourably to placebos would be an advantage.

The effect of the presence of placebo reactors in comparative studies of drugs has already been discussed, but the importance of placebos extends beyond this. Although placebo reactions may usually appear to enhance the drug effect, they may also subtract from it. An instance of this was quoted from Wolf (1950) and another is provided by Cameron and Kasanin (1941) who reported that "two patients said that after taking amphetamine at night (by mistake) they slept very much better, and they asked that the drug be substituted for phenobarbital". (But it is not quite clear whether this was a result of the patients' preconceptions, or some paradoxical pharmacological effect of the drug.) Such phenomena at least help to focus attention on the individual reactions to drugs, and it is increasingly recognized that "in evaluating a drug one needs to know not only the nature of the drug but also the status of the individual at the time the drug is given" (Grace, 1954).

The significance of placebo reactions for psychiatry is considerable. Tibbetts and Hawkins (1956) claim that the majority of "novel physical treatments" such as carbon dioxide inhalation and intravenous acetylcholine, "are likely to prove to be placebos". They imply that similar considerations may apply to psychotherapy.

The necessity of allowing for the placebo effect in assessing the effects of psychotherapy has been emphasized by Rosenthal and Frank (1956). They argue that "to show that a specific form of psychotherapy based on a theory of personality and neurosis produces results not attributable to the placebo effect", it is necessary to compare it with "another form of therapy in which patients had equal faith, so that the placebo effect operated equally in both". It is possible that satisfying this criterion may give no corresponding satisfaction to the advocates of psychotherapy.

SUMMARY

The reported effects of placebos are briefly described, and the attempts to relate the occurrence of these effects to personality are reviewed. The role of secondary suggestibility and learning is emphasized, and the implications discussed.

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FOLIE À TROIS: A CLINICAL STUDY

By

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THE following case of Folie à Trois, in which a married couple and the husband's brother shared a system of paranoid delusions, is being reported firstly because of the rarity of the condition, and secondly because it presents several unique features which it is hoped will shed further light on the nature of induced psychosis.

INCIDENCE OF FOLIE À TROIS AND OF CONJUGAL PSYCHOSIS

Gralnick (1942), in his review of Folie à Deux, quotes 96 cases previously reported in the English literature, and adds 7 of his own. Of these, 103 cases of what he called Psychosis of Association, 11 were instances of Folie à Trois. Since 1942, only 4 further cases of Folie à Trois have been described in the English literature (Kepner, 1943; Kesselman, 1944; Partridge, 1950; Bauer, 1953). In Gralnick's series husband and wife were affected in 26 cases, 2 of them being instances of Folie à Trois. The woman was the dominant partner in 15 of the 26 cases. Since 1942, 7 further cases affecting husband and wife have been reported (Kesselman, 1944; Kramer, 1947; Schmidt, 1949; Prins, 1950; Partridge, 1950; Zabarenko *et al.*, 1950; Freyhan, 1952), of which two were instances of Folie à Trois. In 6 of these 7 cases the wife was the dominant partner.

Thus, in the English literature, only 15 cases of Folie à Trois have been reported. The number of cases of induced psychosis, in which the affected persons had been husband and wife is 33. In 21 of these the wife was the dominant partner.

CASE REPORT

Mrs. A.D., aged 62, was admitted to the Maudsley Hospital on 2 January, 1956. She believed that her flat was being sprayed with acids and oils by her neighbours, against whom she was constantly making accusations.

The history goes back to 1944, when the patient, then aged 49, and her husband, Mr. A.D., then aged 51, moved into a basement flat which they had long coveted because of its attached garden, and began to grow vegetables. When these appeared, Mrs. A.D. saw white spots on them, and thought that her next-door neighbour was poisoning her plants because he was envious of the garden. She told her husband that she had seen this neighbour spraying her vegetables with caustic soda and carbolic acid. The husband believed her, and on examining the cabbage leaves more closely, he found tiny holes in them, which he took to support her allegations. He began to shout complaints at the neighbour, and later approached a solicitor on whose advice he brought an action against the neighbour, which he won. The neighbour, however, appealed, and won the appeal. This caused much upset to the patient and her husband. They continued to feel persecuted, stopped growing vegetables, and have referred to the proceedings ever since as "the garden case".

In 1945, the husband's crippled brother, Mr. B.D., then aged 53, who had spent much of his life in institutions, came to live with the couple. He was told about the "garden case" by Mr. A.D. and soon he also claimed that he saw the neighbour spray something into the garden, and accepted his brother's explanation that it was acid.

It was then that Mrs. A.D. became convinced that acids, oils, and caustic soda were being poured into their flat. She said she saw liquids coming through holes at the edges of the ceilings, and that sometimes they splashed on the floor by her feet. She pointed out marks on her own and her husband's clothing, and complained of a burning sensation on her arms which, she said, was due to the neighbours directing a spraying machine at her from their upstairs flat. She thought the neighbours were scheming to get her family out of the house. She complained about this to her husband, who then said that he also saw the stains, which

he later described as "all different coloured stuff on the sheets". On one occasion he felt a puff of air on his face, and was convinced that this was the spray. The stuff that was sprayed on them he described as "a kind of an oil" which seemed "as though it had come from a car spray from the corner of the room".

The brother-in-law said that he could not but help agreeing with the others about this persecution. He occasionally felt his skin burning, noticed pimples on his arms, and commented on an odd smell in the flat. He, however, took no part in the activities of the others to take precautions and to seek redress. All three felt that Mrs. A.D. was the main target of the attack. She began to protect herself by wearing a house coat and two pairs of stockings indoors, covering her head with a scarf, and keeping her glasses on at night. Mr. A.D. wore a cap indoors. Mrs. A.D. soon proceeded to move all the best furniture into the bedroom, and to cover it and the beds with dust sheets. She also hung sheets across the kitchen ceiling, and wrapped paper around all the indoor pipes. She and her husband frequently complained to the neighbours, and several of them moved away on this account.

In 1949 Mrs. A.D. was bound over to keep the peace after attacking a neighbour with a bottle.

In 1950 the patient and her husband began to write letters of complaint to the landlord. They frequently called on the sanitary inspector and showed him their bedding, and bottles full of a liquid which, they said, contained some of the acids and oils. They also complained to the R.S.P.C.A. that a particular neighbour upstairs was poisoning their cat. This neighbour found it necessary to put black paint on the glass of her front door because the patient and her husband often stood on the landing outside, shining a torch through.

In 1951, Mr. and Mrs. A.D. consulted their doctor, since they felt their health was being undermined, and they subsequently attended the psychiatric department of a London teaching hospital. Admission to a mental hospital was not then considered necessary, and, in the hope that a change of environment might lead to improvement, application for rehousing was encouraged and supported. Meanwhile, Mrs. A.D. arranged for all three to have their meals at the civic restaurant, and to spend as much time as possible out of doors.

However, their distress increased. They accused the neighbours daily, and Mrs. A.D. in particular, was heard to shout and swear at them until late into the night. They began to chalk on the walls of their house that they were being poisoned, and in 1952, they put up a large board in their front window with writing on it saying "we are being poisoned with acid and oil, torture day and night". This caused crowds to gather in the front garden, particularly on football match days. Finally, when the patient threatened to burn the house down, the neighbours wrote a joint letter to the landlord, who took action, and all three people were admitted to an Observation Ward.

Here Mrs. A.D. was certified and sent to a mental hospital. The two men were discharged home in the hope that separation from the dominant member might lead to a remission. However, five weeks later they ordered the release of the patient under section 72, and she had to be discharged. They continued to disturb the neighbourhood, and three months later all three were certified and admitted to a mental hospital.

On admission they were all agitated and deluded, and complained that they were being tortured by their neighbours. At first they were in a block where they saw a good deal of each other. Later Mrs. A.D. was separated from the men. These became voluntary patients three months after admission, and a few days later gave in their notice of discharge and returned home. One month later Mrs. A.D. assumed voluntary status, and she also then discharged herself from hospital. All three patients were assessed as being in a state of reasonable remission when they left the hospital, having lost their active delusions, but not having regained insight.

Despite the fact that they subsequently maintained that they had been mentally perfectly normal at the time, and that they had been wrongfully sent away as the result of "poison pen letters" written by the neighbours, they were contented in hospital. Mrs. A.D. said they were well treated there, and that the country air did her good. The two men enjoyed working in the garden, and the brother-in-law subsequently made presents for the wards for Christmas. Their only complaint was that they were kept in hospital for too long, thereby losing wages unnecessarily.

After their return they had no complaints to make about the neighbours. This "improvement" they attributed to the intervention of a social worker who had called on the neighbours while they had been in hospital. Shortly afterwards they were rehoused and since then they have lived in a pleasant modern flat on the outskirts of London. Here they were visited by a social worker late in 1953, and were found to be cosily settled. The husband had returned to his former job, the brother-in-law kept himself busy polishing the furniture, and making artificial flowers and wooden ornaments, while Mrs. A.D. did the shopping and was at that time looking for a new job, which she found shortly afterwards. For recreation they went for walks, and looked out of the window.

All remained well until July, 1955, when the family by whom Mrs. A.D. was employed as a daily help went on holiday, leaving her in charge of the house. Both she and the brother-in-law worried a great deal over the fact that nothing was locked up inside the house, and that silver and valuables were displayed for anyone to see. The brother-in-law warned her of burglars at the time, and she felt her responsibilities to weigh heavily upon her.

In August she complained to her doctor of a burning feeling inside the chest, which she at first attributed to overwork. Subsequently her mouth felt dry, the burning sensation spread

all over her body, and gradually all her past delusions returned, the only difference in her statements being that in addition she now complained at length about a drill which she felt on her skin, and which made her shake.

This time, however, her delusions were not shared by the two men, who saw and felt nothing and told her it was all her imagination. They explained her symptoms on the basis of worry, which they thought had caused the memories of "the garden case" and their subsequent persecution to play on her mind once more. Nevertheless, the husband did say that at that time the upstairs neighbours were particularly noisy, that they used a drill for carpentry, and that they often laughed very loudly in order to annoy him, his wife, and his brother, because they kept themselves to themselves too much.

Mrs. A.D. felt that a change had come over her husband, and that she could no longer discuss anything with him because he had "become so stubborn". Once more, despite protests from the men, she began to wrap herself up, and to spend most of her day out of the house. On several occasions she was seen pointing to the window, or shaking her fist and shouting at the wall. The brother-in-law then said to the husband "she'll have to go away again". In October, 1955, she consented to hospital admission as a voluntary patient, but discharged herself four weeks later. Subsequently the neighbours took action once more, and she was re-admitted to an Observation Ward, from where she was transferred to the Maudsley Hospital in January, 1956.

Family History

In neither family has there been any mental disease, and there is no genetic relationship between the patient and her husband.

Personal Histories

Mrs. A.D. comes from a working-class family. Her father was a sign-writer and carriage maker. She is the sixth of seven siblings of whom her favourite was an older sister who died in October, 1955, having been ill with cancer of the breast for the previous 5 years. The patient's childhood was a happy one. Her father was good but very strict, and of her mother she said "she was very lovely". She reached top standard in an elementary school, helped her mother at home for 3 years, and then went into domestic service, holding a series of jobs, since according to her "a change is as good as a rest sometimes". During the first World War she worked in a munition factory, and she talked with satisfaction of her dealings with poisons there, and of how she had to wear protective clothing and drink extra milk to keep herself fit. After her marriage she did daily domestic work, particularly enjoying jobs where there were children.

She was extremely reticent about her sexual life. She had had few boy friends. She had had an illegitimate baby who died, and in this connection she had had a pelvic operation the details of which she would not disclose. At the age of 39 she married Mr. A.D., whom she had known for 6 months. They had been very happy together until the summer of 1955. The patient had a protective motherly attitude towards him, and referred to him as an invalid on account of the chronic chest trouble which he had had since the first World War. He in turn always allowed her to buy whatever she wanted. She was very pleased when her brother-in-law came to live with them, and of him she said "he's what you'd call a nice young man if he weren't a cripple".

The patient's social life had for years been limited to her own immediate family. She seldom spoke to anyone except the children in the streets, among whom she used to distribute sweets. Her main interests were her home and her "sick husband".

She had always had a happy nature. Her husband described her as outspoken, active and hardworking, and her brother-in-law agreed with this. Her husband's sister, who disliked the patient, described her as domineering, and mentioned her interest in spiritualism.

The two brothers also come from a working-class family. Their father was a porter at Covent Garden market. There are four siblings, B.D. being the oldest, and A.D. the second. There are a younger sister with whom relations have been poor since A.D.'s second marriage, and a younger brother who is in the army.

Mr. A.D., the patient's husband, spent the latter part of his childhood with his grandparents in the country. This was because when his grandmother saw him at the age of five, she said she would cure his squint which he had had since early childhood. She kept him away from the sun, and made him wear a green shield over his eyes. He also considers his childhood to have been very happy, and on his return home at the age of fourteen he became a brass finisher and polisher, working with acids. Apart from three years in the army during the first World War, he continued with this job until around the onset of the present illness. At this time he became a metal sprayer, working with oxygen, acetylene, and air, all of which he considered to be very healthy.

He had been married before, his first wife dying of puerperal fever. He has a daughter aged 40, and a son who is a little younger. After their mother's death, both children were sent to institutions, for which they and their aunt have not forgiven their father. The son lived with him for a time after his second marriage. He was in a Borstal institution at one stage, but was said to have married subsequently, and to be doing well.

Mr. A.D. was described by everyone as a very quiet, steady man, interested only in his home and garden.

Mr. B.D., the patient's brother-in-law, developed osseous tuberculosis at the age of 7, and spent most of his childhood in various hospitals, where his schooling was irregular. He had one leg amputated, and became seriously deformed as a result of his disease and multiple operations. At the age of 16 he returned home to live with his mother until she died when he was in his thirties. Thereafter he lived in various institutions, where he became fond of gardening and of making things with his hands.

As a child he was said to have had temper tantrums; later he was regarded as a stable, quiet man, who until Mrs. A.D.'s relapse, lived harmoniously together with the other two, assuming a slightly protective role towards his sister-in-law. A minor domestic detail was that he used to clean her shoes, while she cleaned those of her husband.

Condition on Admission

Mrs. A.D. was a pale, large but frail woman, with a marked right internal strabismus, present since a childhood attack of whooping cough. Of this squint the husband, whose grandmother had not succeeded in curing his own strabismus, was entirely unaware. She had a generalized coarse tremor, which was particularly marked when she spoke about her delusions. This again was a family symptom, the brother-in-law being inclined to tremble when upset.

The main abnormalities in her mental state were her behaviour, her mood, and her delusions. She spent most of the day walking about, hands clasped behind her, and kept very much to herself. She helped a little in the ward, knitted at times, and often wrote on scraps of paper which she threw away before anyone could see them. Every day she collected pieces of paper to use as padding under her clothes to protect herself against the spraying. She scraped the top layers of butter off her bread, insisted on having the first cup from the teapot, and never allowed food to remain uncovered for any length of time. She frequently threw food she considered to have been contaminated on to the floor, and at one stage she spat a great deal. She refused to have a bath, since she considered the water to contain acids, and also refused medication of any kind. On her husband's visits she tended to be angry with him, criticized the presents he brought her, and often ignored him altogether.

She made good contact with other people, and was pleasant as a rule. Her talk was normal in form, and concerned itself mainly with her delusions and her husband. Her mood was one of cheerful friendliness, which became incongruous when it persisted during detailed descriptions of her sufferings. At times she was suspicious and verbally aggressive. She believed that even in hospital the neighbours were spraying and drilling her, that similar things were happening to her family at home, and that the other patients would be burnt if they came too near her. When asked why her neighbours should do all this, she said she supposed it must be a habit by now, and that they wanted to take their revenge on her. She talked with particular emphasis of how the neighbours had drilled her husband's brain, and seemed to explain what to her was his recently changed attitude on this basis. As for herself, she thought that acids were poisoning her blood and her water, and that to remedy it she needed fresh air and plenty of fruit and milk.

She was correctly orientated, and her memory was not impaired. Her attention was easily aroused but not sustained and she refused to co-operate over formal tests, saying that the neighbours should be tested and not she. She did not consider herself to be mentally ill, but expressed a desire to return to her former mental hospital, which was situated out of London, and where she thought the air would be better.

Mr. A.D., the husband, was a quiet, small, thin, unhealthy looking man, with a mild squint and a cough. He was friendly and uncertain in manner, and talked of his wife with great respect. His intelligence appeared to be low. He was still quite convinced that his past beliefs had been true, but, although not entirely happy about the present neighbours, insisted that no one was now persecuting his family. He disliked discussing his wife's complaints and preferred to talk about her strange behaviour. He was very anxious that she should stay in hospital until she was well, and he felt rather bitter about the fact that they had still not "seen the end of the garden case".

Mr. B.D., the brother-in-law, looked healthy and young for his age, despite his severe deformities. He also was quiet, but although his intelligence was probably as low as that of his brother, he had a more forceful personality, and made more definite if even more guarded statements. He described how he had tried to argue the patient out of her strange ideas and had failed. He also had no retrospective insight into his illness. He avoided discussing it, but if pressed, admitted that their former neighbours had sprayed their garden and their flat and that he also had felt the acids at times. He said the present neighbours were inquisitive people, who were always peeping through their curtains, but otherwise he was quite satisfied with them.

Progress

Attempts were made to try the effect of Largactil on the patient's mental state, but she was unco-operative. After six weeks she gave in her notice of discharge, was once more admitted to an Observation Ward, and was from there sent to a mental hospital as a certified patient.

DISCUSSION

It is proposed, in the light of the above case, to examine some of the conclusions of other authors about the nature of the process of induction. It is not proposed to consider further the possible constitutional predisposition to paranoid schizophrenia or other psychoses which may or may not exist in these cases. In our case there is no evidence for this, in the absence of a family history of mental disorder and of a genetic relationship between the patient and her husband.

It has been said by almost all writers since Lasègue and Falret published their views in 1877, that the acceptance of delusional beliefs by one person from another occurs only after lifelong and intimate association. That this need not be so is illustrated by our case, in which the brother-in-law had joined the household of the patient and her husband only very shortly before he came to accept their delusions.

Helene Deutsch in 1938 reported the case of a schizophrenic girl who accepted the delusions of a chronic paranoiac very shortly after her first contact with him in the village of her birth, which she had revisited on a holiday. The suggested explanation for this instance of induction was that the girl was able to identify with the man because the content of his delusions corresponded to her own unconscious fantasies, and that in accepting them she was furthering her own wish fulfilment.

The important factor in the process of induction appears to be that of identification of the induced partner with the inducer. This may take place on the basis of the content of the delusions alone, as in Helene Deutsch's case, but more commonly it occurs as the result of a particular type of relationship between two or more people, which as a rule has developed on the basis of long and intimate association with each other, in relative isolation from the outside world. Greenberg (1954) in his review of the literature mentions the mental mechanisms which were at various times thought to be involved in folie à deux. He agrees with the importance of identification, but, in addition, leans on MacAlpine and Hunter's psychopathological theory of paranoid schizophrenia. He suggests that the induced, perhaps as a result of contact with the inducer, develops a hypochondriacal state which he then explains in terms of the delusions of his dominant partner.

The fact that the sharing of delusional beliefs by members of the same family is very rare, whereas the development of common customs, habits and opinions in members of the same household is usual, must be due in part to the nature of the delusional beliefs. These, as was pointed out by Coleman and Last in 1939, are as a rule based on a very personal fantasy, and develop as a solution to a very personal problem. They are therefore of little value to other members of society or even of the same family. In fact they act as a wall around the patient, which at first he attempts to break through to save himself from his painful isolation.

It appears, therefore, that in addition to the special type of relationship between the people involved, which favours induction, and which will be dealt with in more detail below, it is necessary that the content of the delusions of the inducer is such that they are understandable for the induced, can assume a place in his fantasy life, and do not increase his isolation to any considerable degree.

It is well recognized that induced psychosis occurs in small family or other social groups which are isolated from the rest of the community, either because of eccentricity, or on account of poverty or other misfortunes. Examples of such social isolation apart from that of poverty, which is mentioned in most

of the published cases, are the two blind women living in an institution, reported by Brussel in 1938, the two brothers with physical defects reported by Gillespie in 1922, the two women, both with mentally defective husbands, living in abject poverty, reported by Coleman and Last, and the schizoid girl reported by Helene Deutsch.

It seems that for such people, who already feel themselves to be isolated from society, the additional isolation through the assumption of delusional beliefs is far less threatening than it would be for people normally integrated in the community. Furthermore, it seems that in these isolated groups the estrangement from each other through delusions not shared is of far greater moment than it would be for people with links outside their own small group.

In this connection it is no doubt significant that the most common delusions to be induced are those of persecution. The object of the supposed persecution is usually the small isolated group as a whole, rather than the inducer alone. Next in frequency come delusions of grandeur and wish fulfilment, again affecting the group as a whole. Marandon de Montyel, in 1881, expressed the view that the content of delusions acceptable to others was determined by the social climate and the prevailing ideas of the times. He said that just as religious mania flourished in the middle ages, an era of faith and superstition, so delusions of persecution were the form of insanity typical of the nineteenth century, an epoch of strife and distrust. The content of the delusional system in our case conforms to that most commonly found in induced psychosis; the patient believed her family to be persecuted by the neighbours. The particular form which this persecution took, i.e. the spraying, was obviously related to her own and her husband's experiences. She had worked in a munition factory during the First World War, and had had dealings with poisons there, while he had recently become a metal sprayer.

Even before the onset of the illness, all three people had been isolated socially, the patient and her husband probably through a number of factors both of temperament and personal experience, the brother-in-law on account of his physical deformity and institutional life.

Hartman and Stengel, in their two papers of 1931 and 1932, also stressed the mechanism of identification as essential for the acceptance of delusions by one person from another, but they saw the basis for this not in the content of the delusions, nor in the social setting of the people involved, but in the particular relationship existing between them. These authors reported three cases of induced psychosis, which resembled our own in many ways. In all three the illness involved husband and wife, and in two children were also affected. In all the wife was the inducer. She was further characterized by being the dominant partner in the marriage, and by being extremely eager to instil her own beliefs into her husband. The authors described these women as belonging to a type of paranoia which has been called "Kampf Schizophrenie". These patients will go to great lengths in attempting to convince others of their own beliefs, in order to keep some hold on the external world. Failure in this may lead to an aggressive outburst, as in one of Hartman and Stengel's cases, in which the woman attempted to murder her husband and daughter when these no longer shared her beliefs. In other cases such failure may result in total withdrawal into the delusional world.

Our patient resembled these women closely. For her also it was very important that her husband and her brother-in-law should share her delusions. After her relapse, when she failed to persuade the two men of her beliefs, she became very distressed, turned from them in anger, and threatened to leave

her husband. She developed delusional ideas to explain his "stubbornness", saying that the neighbours' drilling had affected his brain.

In Hartman and Stengel's cases all three husbands were weak, timid men, who were inadequate both sexually and in the economic sphere. The authors suggested therefore that these men had a deep sense of guilt towards their wives, and that this explained their readiness to identify with them and to accept their delusions.

In our case also, despite the lack of evidence about the sexual relationship, it was obvious that the husband was weaker than his wife, of whom he always spoke with great respect and admiration. She was intellectually superior and physically stronger than he, referred to him as an invalid, and talked in a severely maternal manner of her concern for his physical welfare. She was always active and gainfully employed, and was responsible for most of the decisions made in the household.

In considering the position of the brother-in-law, the following factors appear relevant. He is a year older than his brother who, at the age of 5, was sent away from home to live with their grandparents. This removal of what can be assumed to have been his rival, is likely to have resulted in much guilt. Moreover, very shortly afterwards, at the age of 7, he developed tuberculosis and was himself sent away to hospital, where he was subjected to multiple mutilating operations, and led a restricted life away from home for the remainder of his childhood. Such events are likely to have fostered not only resentment against the world at large, leading to his reputed irritability and temper tantrums, but also an increased feeling of resentment against his younger brother, resulting in a still deeper feeling of guilt towards him. When in 1948 after years of institutionalization, he was offered a home by this brother, the isolation due to his physical deformity, his unmarried and insecure social state as compared with his brother's relatively successful position, as well as his old sense of guilt, can all be understood to have contributed towards his readiness to identify with his brother, and to accept the delusions then held by him and his wife.

So far the development of the illness in our case has been used to illustrate three main factors, which, apart from constitutional predisposition, would seem to be of importance for the induction of psychosis: (a) the social isolation of the small group affected, (b) the content of the delusions developed by the dominant partner which are such as to be acceptable to the other members of the small isolated group, and (c) the identification of the induced with the inducer on the basis of guilt feelings enhanced by social isolation.

Our case is remarkable in three respects:

1. Induction of the delusions proceeded in a hierarchical manner.
2. A change of environment produced a remission not only in the submissive partners, which is a relatively common event, particularly after their separation from the dominant partner, but in the dominant partner herself.
3. When the delusions recurred in the dominant partner, she was no longer able to impose them on the other two members of her household. This failure of induction, in the absence of significant changes in the social setting of the group, and in the content of the delusions, must be attributed to a changed relationship between the three people within the group.

In most of the reported cases of induced psychosis involving more than two people, the dominant partner was responsible for the induction of all the others. In our case, the patient imposed her delusions on her husband, and he in

turn imposed them on his brother. This sequence of events is understandable in terms of the social setting of the three people, the relationship between the patient and her husband, and the initial relationship between the husband and his brother, all of which factors have been analysed above.

Remission after hospitalization of both partners of a folie à deux and subsequent relapse has been described by Freyhan in 1952. In his case, however, there was never a well-developed delusional system shared, the illness of the two differed in several respects, and when the wife relapsed, the husband developed a catatonic state just as she was to be re-admitted to hospital.

One can only speculate on the cause of the remission in our patient. It may be that her admission to the mental hospital, which received her husband and brother-in-law at the same time, and allowed them to see each other initially, did not as often happens increase her isolation, but on the contrary helped her towards a fuller social life than she had previously found possible. It seems likely that the degree of her social isolation was an important influence on the course of her illness, since she failed to improve when she alone was admitted to hospital, as happened once before her remission and once after her relapse, and since this relapse occurred when her employers went on holiday, leaving her alone in the house. The husband and the brother-in-law also failed to remit after the patient's first admission to hospital, when they were left alone at home, but both improved when all three were admitted to a hospital, where, as they all emphasized, they were kindly treated, and where the two men were able to take an active part in the communal life. Thus, temporary integration of the three people together into a hospital community led to a remission in all of them, whereas the separation of the dominant partner from the other two failed to achieve an improvement. This supports Ascher's suggestion that enforced separation, as advocated by Gralnick, may not be advisable in every case of partners of folie à deux. Gralnick stressed the sociogenesis of induced psychosis and recommended isolation of dominant partners of folie à deux as for infectious cases. Ascher (1949) thought that, in view of the poor prognosis in the case of the two sisters he described, it was not justifiable to separate these two people who could communicate fully with no one but each other. The course of the illness in our case suggests that a diminution of the social isolation of the group as a whole may even on occasion enable its members to give up their delusions.

The explanation for the failure of induction the second time, must be sought in the greater resistance on the part of the husband, since the patient's efforts at induction appeared to have been no less vigorous than before. During their infrequent visits to the patient while she was in the Maudsley Hospital, it was quite obvious that the husband was afraid of again coming under his wife's influence, and that the brother-in-law was trying to prevent this. They attempted sometimes quite brutally to convince the patient of the foolishness of her beliefs, and both tended to avoid discussion of their own past delusions. It appeared that it was no longer necessary for the husband to share his wife's beliefs in order to escape isolation, since he was now neither alone, nor alone in his opposition to her. Perhaps also his feelings of guilt towards his wife on account of his own inadequacy had been lessened by his introduction into the household of his brother, who, though crippled, had adopted a protective and gallant role towards his sister-in-law and was fulfilling some of the husband's function in the home. The brother-in-law's personality was more forceful than that of the husband, and over the years his position in the household had become stronger, so that the husband now turned to him for some of the decisions which

he had previously sought from his wife. This was encouraged by the brother-in-law, who was seen on occasion to defend the husband against possible threats, including the patient's dangerous beliefs, which, he realized, had previously resulted in all of them being sent away to hospital. It was the brother-in-law who saw to it that the patient was re-admitted to hospital when she relapsed, and who persuaded the husband of the inadvisability of her return home unless she had fully recovered.

SUMMARY

1. A case of Folie à Trois is reported, in which delusions of persecution were shared by a married couple and the husband's brother.

2. The remarkable features of the case are: (a) the hierarchical process of induction, whereby delusions were transmitted from the wife to her husband, and from him to his brother; (b) the remission of symptoms in all three people, although without return of insight, after their simultaneous admission to hospital; and (c) the failure of the woman's attempts at induction when her delusions recurred three years later.

3. The dynamics of the illness are discussed in the light of the social setting, the delusional content, and the changing relationships within the family group. Social isolation is seen to be an important factor in this as in previously reported cases, and its temporary decrease brought about by admission to hospital was followed by a remission. The content of the delusions developed by the dominant partner was meaningful to the others affected, and was such as to encourage their identification with the inducer. The initial relationships between the wife and her husband, and between the husband and his brother, show many features previously observed in cases of induced psychosis. The concept of an increased readiness of the submissive partner to identify with the dominant partner because of guilt feelings is found particularly helpful for the understanding of the initial induction of the husband and the brother-in-law, and of its failure some years later when the pattern of relationships within the family had changed.

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AN ENQUIRY INTO THE DETERMINANTS OF A DIFFERENTIATION BETWEEN ELDERLY "ORGANIC" AND "NON-ORGANIC" PSYCHIATRIC PATIENTS ON THE BENDER GESTALT TEST*

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I. PURPOSE

In a previous study, Shapiro, Post, Lofving and Inglis (10) found that a modified version of the Bender Visual-Motor Gestalt Test differentiated, at a high level of confidence, three groups of elderly psychiatric patients: brain-damaged patients, functionals and a group of doubtful diagnosis. This level of confidence was far higher than that of any of the other 24 tests used. Furthermore, a number of recent studies have shown that the Bender test differentiated Organic from non-Organic subjects (2, 4, 6, 7, 8). In our own Department Yates (13) found significant differences on measures of the reproductions of other designs between Organics and Functionals. In view of these findings we decided to investigate our own results further. Our general purpose was to measure and control some of the variables appearing relevant in the performance of the task and in this way make possible testable explanations for the results.

To achieve this purpose we had to overcome the following difficulty: The differentiation obtained by the Bender Gestalt Test was based on the use of subjective scores allocated according to a rating-scale. The scores for the individual reproduction were summed to give an aggregate score for each subject. It was this combined score which differentiated between the groups in our first study. It was impossible to say exactly what these aggregate scores were measuring and therefore what aspects of the drawing performances required explanation. For this reason we decided that the first step of our investigation must be to objectify the method of scoring which was used in the first instance. This paper is concerned with a description of the attempt and its outcome.

II. SUBJECTS

The 89 patients involved in this study are described in more detail elsewhere (10). Their ages ranged from 60-92, with a mean age of 68.6 years. They were arranged into three diagnostic groups, 16 Organics, 58 Functionals and 15 "Doubtfuls", according to objective psychiatric criteria which were developed especially for our purpose (10). These groups of patients were

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defined respectively as suffering from "Psychiatric illnesses definitely associated with cerebral pathology", "Psychiatric illnesses not associated with cerebral pathology", and "Psychiatric illnesses associated with very mild or dubious organic involvement". Care had been taken to avoid contamination of diagnosis both by knowledge of test results, and by basing any part of the diagnosis on what the tests were supposed to measure.

III. RESULTS OF THE INITIAL STUDY

The Bender Visual Motor Gestalt Test consists of nine simple designs presented successively, after the subject has been instructed to copy them with a pencil on a sheet of paper in front of him. In our first study the test had been modified in certain ways. Designs 1, 5 and 7 were excluded. Design 2 was simplified and Design 3 enlarged, to enable patients with slightly defective vision to do the test. The score for each reproduction was derived from a 5-point rating scale. The criteria for the rating scale were based on Bender's suggestions (1). Examples of the criteria used for one of the designs are given in Table II.

As was stated above, an Analysis of Variance of the results had shown that the Bender Test differentiated the diagnostic groups at a higher level of confidence than any of the other 24 tests used in that study ($P < .1$ per cent. $F = 8.82$). It is important to note that neither the Wechsler weighted scores (four sub-tests) or age differentiated the diagnostic groups. A correlational analysis of all the differentiating tests indicated that the Bender test had little in common with the other tests, except the variance held in common with the Wechsler scores (5).

IV. SELECTION OF MATCHED GROUPS

The preliminary analysis was carried out on two matched groups consisting of 15 Organics and 15 Functionals. The 15 Organics were in fact all the Organics used in the initial study, but one, whose record had been lost. The 15 Functionals were selected from our original Functionals by matching them as closely as possible with the Organics for age, Wechsler weighted scores and sex. The remaining 43 Functionals and 15 Doubtfuls were retained for cross-validation.

We succeeded in matching perfectly for Sex, but for Age and Intelligence there remained unavoidable differences within pairs. As Table I shows, Organics are brighter than Functionals, the difference being significant at the <5 per cent. level. The Organics are older than the Functionals although the difference fails to reach the 5 per cent. level of significance. If anything, the group differences should result in it being more difficult to obtain large differences between the Organics and Functionals on the Bender test, as the Bender was significantly correlated with the prorated Wechsler scores in the second study (5).

TABLE I
Differences Remaining between Matched Groups

	Intelligence (Wechsler prorated weighted scores for 4 sub-tests)			Age (years)		
	Mean	Range	SD	Mean	Range	SD
N = 15						
Organics	54.80	15-127.5	30.50	71.00	62-92	8.76
Functionals	52.53	25-125	30.20	68.07	61-81	5.26
Correlated 2-tailed t						
test*	A = .265 $P < .05$			A = .301 $P < 10\%$		

* $t = N - 1/AN - 1$. Sandler (9).

Using the rating-scale scores the Bender test now differentiated the matched Organics and Functionals at beyond the 5 per cent. level of confidence ($A = .265$, 14df). The complete groups had been differentiated at beyond the .1 per cent. level, the difference in the level of confidence being due to equating the two groups on the matched variables. We decided that any new measure would have to differentiate the means of the matched groups at beyond the 5 per cent. level of confidence at least, as did the rating-scale scores.

V. PROCEDURE

Having examined a sufficient number of different measures some would differ significantly by chance alone. By definition one out of any 100 randomly-selected measures will differentiate two groups, identical in fact, at the 1 per cent. level of confidence. Any measures which differentiated between our two matched groups at an acceptable level of significance would, therefore, have to be cross-validated on another sample. For this purpose the 43 Functionals who remained after the selection of 15 to match the Organics could no longer be regarded as a strictly random sample of Functionals admitted to the Geriatric Unit over a given period. Such objection cannot be made against the 15 Doubtfuls, who were patients who fulfilled neither the organic nor functional psychiatric criteria. Being a mixed group their mean on a newly-found differentiating measure could be predicted to fall between the means of the matched samples. In any case, the best guess would be that, given two significantly different means, a third mean would fall between them. However, we could in addition, assume that the Doubtfuls contained a higher proportion of Functionals than of Organics as was the case in the whole sample of admissions. We therefore predicted that on a differentiating measure the mean score of the Doubtfuls would differentiate the Organics at a higher level of confidence than the Functionals.

A second independent contribution to validation was supplied by the 43 remaining unmatched Functionals. They are less similar to the Organics on the matched variables than the matched Functionals. It follows, therefore, that a measure which differentiates the matched Functionals from the Organics should also differentiate the remaining Functionals, and, if anything, at a higher level of significance.

Thirdly, evidence for the validity of an objective measure was available from correlations within each diagnostic group, and from these groups combined. Any measure which was truly an objectification of the original subjective scale would have to correlate significantly with that scale.

Fourthly, the original scores should not retain, independently of the objective measure, any part of their variance which differentiates significantly between Organics and Functionals. This could be checked by an Analysis of Covariance.

VI. THE OBJECTIFICATION OF SUBJECTIVE CRITERIA

(i) *Procedure*

Our first attempt at objectification consisted of trying to express the criteria corresponding to each rating-score into clearly defined objective measures. For example, in Design A (Fig. 1) a score of 5 was awarded for a "good square and good circle. Especially diagonals should be about equal. They must still touch." Our attempt at objectification of these criteria was to measure the diagonals of the square and find a ratio by dividing the length of the longer

by that of the shorter. About 30 such measures, based on 57 measurements for each record were taken. Similar measures were grouped together in five classifications. The measure in our example was classified with similar ratios from other designs as a Proportionality measure (Table II).

TABLE II
First Analysis of Rating-Scores for Design A

Original Rating Score	Original Scoring Criteria	Objective Measures	Classification
1	Scribble or drawing which has no resemblance to test design		
2	Two loops incompletely closed; they may touch, overlap or have considerable space between them. Or one closed loop resembling either a square or a circle		
3	Two closed loops in horizontal plane, the second modified to resemble a square and the first modified to resemble a circle; they may touch or have some space between them	Deviation from horizontal best-fit line	Horizontal orientation
4	A fairly good circle and a fairly good square and square orientated on the diagonal; they should touch and size of two reproductions should be about equal	Deviation from vertical of vertical diagonal. Distance between parts	Vertical orientation Separation of parts
5	Good square and good circle. Especially diagonals should be about equal. They must still touch	Ratio of diagonals of square	Proportionality

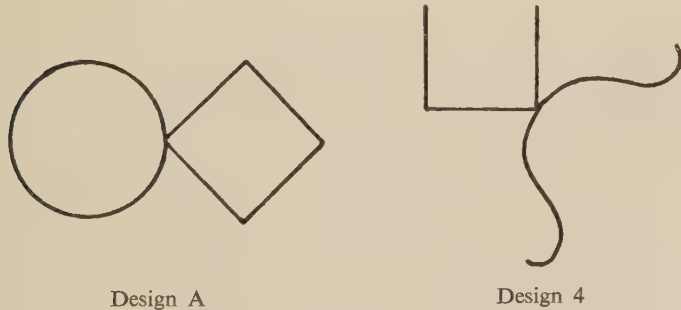


FIG. 1.—The two Bender Gestalt Test Designs used for the Diagonals and Angles Measures.

(ii) Results

Histograms were drawn for each measure and for the similar measures combined under their separate classifications. There was a marked trend in the histograms for Organics to copy the designs less accurately on all the measures than their matched Functionals, but in no case did the means of the two groups differ as significantly as the means of the subjective rating-scale scores.

It is not suggested that the measures selected are the only or the best objectification of the subjective criteria. The task proved difficult and laborious, but our findings were not promising enough to pursue further.

(iii) *Conclusion*

One reason for the lack of differentiation suggested itself to us. Some reproductions could not be measured at all because of their poor quality, although they could be scored according to the subjective criteria. The reproductions, as their quality falls, diverge more and more from the original designs. The more they diverge, the less amenable do they become to measurement by a common objective standard. For example, on Design A a score of 1 is given when there is only a scribble, but a measurement on Proportionality can only be made if it is possible to draw diagonals in the square. This would not be possible till the design is good enough to deserve a high subjective rating. Thus, compared to the rating-scores, our measures appeared seriously blunted at the lower level of quality of the reproduction of the designs.

VII. "UNMEASURABILITY" AS A SCORE

(i) *Procedure*

To check the correctness of this view we set up an "Unmeasurability" criterion. Confining ourselves to the most clearly definable of our measures (Vertical and Horizontal Orientation, Proportionality and Area), the score of 1 was given for each measure per reproduction which could be made. A score of 2 was given in each case where the parts of the reproduction required for any measure were clearly missing but could be identified from what was reproduced, i.e. the rest of the drawing was well enough done to indicate that the part in question was clearly missing. A score of 3 was given in each case where the parts of the reproduction for any measure were not identifiable.

(ii) *Results*

The results were consistent with our explanation. The rating scale scores could quantify the least accurate copies. The objective measures we had used could not.

"Unmeasurability" identified the same 4 Organics in the same order outside the overlap as the rating-scores. Of the 15 matched pairs, 9 Organics and 14 Functionals gained the same minimum score on the "Unmeasurability" criterion; that is, all the measures could be made on all of their reproductions.

No conventional statistic could aptly be used to reject the null hypothesis for this distribution. But if we think of these 30 cases as ranked, the probability of finding the same 4 cases in the same order at the same end of the scale as with the subjective scores is not less than 1 in 27⁴. We can therefore reject the explanation attributing the results to chance at beyond the .001 per cent. level of confidence.

"Unmeasurability" was not as effective as the original subjective scoring in the total sample. Here the subjective method placed 10 of the 58 Functionals outside the overlap but "Unmeasurability" identified none. All of the Doubtful group produced perfect "Unmeasurability" scores and so cross-validation of this finding was not possible.

VIII. THE MEASUREMENT OF AN "OBVIOUS CHARACTERISTIC"
OF THE DRAWINGS(i) *Procedure*

It was clearly necessary to make another attempt to objectify the scoring. It seemed to us that in view of the nature of the subjective criteria, many attempts at analysis could be made and the differentiating parts of the drawings might still remain undiscovered. We therefore decided to alter our line of approach. Instead of a deductive analysis based on the criteria of the subjective scores we set up, on *a priori* considerations, conditions with which our measure would be expected to comply. These were:

- (a) that the aspect concerned must be obvious, likely to catch the scorer's eye and hence influence his rating;
- (b) that the measure must be applicable to the records of every subject so that we would have to omit as few cases as possible;
- (c) that the particular characteristic must be easily and unequivocally measurable.

The characteristic that complied most completely with these conditions was a ratio of diagonals in the square of Design A and the open square of Design 4 (Fig. 1). Firstly, the ratio of diagonals is a measure on which quantitative differences are obvious and therefore likely to influence ratings. Secondly, there was only one Organic where the Diagonals Measure was impossible on both copies, and two Organics where it was impossible on one or other of the copies. For purposes of statistical analysis we omitted the one Functional who was matched with the Organic who produced two unmeasurable designs. In the case of the two Organics who produced only one measurable copy each we used the measure on that one reproduction. In all cases where the two copies were used an average was arrived at. The third condition was also met; the diagonals were easily and unequivocally measurable. None of the other designs fulfilled the three conditions.

(ii) *Results*

The significance of the difference between the means of the Diagonals Measure of the matched Organics and Functionals, was found to be beyond the 5 per cent. level of confidence ($A = .247$, 13 df) and in the expected direction.

It was now necessary to cross-validate and further investigate this, the new measure.

Firstly, the records of the 15 Doubtfuls and 43 unmatched Functionals were measured and the ratio of diagonals derived. A one-tailed test for uncorrelated means was used, the direction of the difference having been correctly predicted. The means of the Doubtfuls and Organics differed significantly at beyond the 2.5 per cent. level of confidence. The difference between the means of all the Functionals combined and the Doubtfuls was significant at beyond the 5 per cent. level. The difference between the Doubtfuls and Organics is at a higher level of confidence than the difference between Doubtfuls and Functionals, in accordance with the prediction.

Secondly, the means of the unmatched Functionals and Organics differed significantly at beyond the .05 per cent. level and the means of the combined matched and unmatched Functionals differed significantly from the mean of the Organics also at beyond the .05 per cent. level of confidence. The differences and other relevant information are given in Table III.

TABLE III

Differences found between the Groups by the Diagonals Measure

(1) Groups compared	(2)	Group (1)			Group (2)			Diff.	A or t Ratio	P	df
		M	SD	N	M	SD	N				
Organics	Matched Functionals	1.266	.150	14	1.158	.144	14	.108	.247	<.5	13
Organics	Doubtfuls	1.266	.150	14	1.164	.080	15	.102	2.304	<.5	27
All Functionals	Doubtfuls	1.131	.097	58	1.164	.080	15	.033	1.212	<.5	71
Unmatched Functionals	Organics	1.118	.074	43	1.266	.150	14	.148	4.933	<.05	55
All Functionals	Organics	1.131	.097	58	1.266	.150	14	.135	4.156	<.05	70

Inhomogeneity of variance was allowed for by the Cochran-Cox Method (11).

Thirdly, significant correlations were found in each diagnostic group and in all the groups combined between the Diagonals Measure and the original subjective scores as shown in Table IV.

The reliability of the Diagonals Measure was investigated. Two of our colleagues measured the diagonals for the matched Organics and Functionals. One of them did this for the Organics and the other for the Functionals. The Diagonals Measure derived from their measurements correlated .92 with the original Diagonals Measure.

IX. THE NATURE OF THIS "OBVIOUS CHARACTERISTIC"

(i) *Discussion*

We had now almost completed albeit in an unexpected manner, the first step of our investigation. We had found an objective measure which appeared to do the same kind of job as the original subjective scale. Nevertheless, the

TABLE IV

Product Moment Correlations between Diagonals Measure and Subjective Rating-scores for the Groups

Group				N	r	P
						%
Organics*	..	..	..	12	.74	<.1
Matched Functionals	..	..	..	15	.66	<.1
Unmatched Functionals	..	..	..	43	.41	<.1
All Functionals	..	..	..	58	.54	<.1
Doubtfuls	..	..	..	15	.56	<.5
All Cases	..	..	..	85	.61	<.1

* Only cases where both copies were measurable are included.

Diagonals Measure still did not appear to be a satisfactory means of investigating the mechanisms affecting the copying of designs by different kinds of psychiatric patients. It was not a direct measure of the outcome of any part of the active performance of making a drawing. The subject does not *draw* the diagonals in the sense that he draws, say, the lines making up his copy. We therefore asked ourselves what parts of the drawing performance would contribute to the ratio of the diagonals. It seemed that there were at least two such determinants; those resulting in the lengths of the sides, and those resulting in the angles between the sides. An investigation of these two aspects of the drawing was, therefore, carried out.

(ii) *Procedure*

The deviation from a right angle of each of the 8 angles in the copies of the two designs was measured in degrees and summed regardless of sign. The result was called the Angles Measure. The Sides Measure consisted of the sum

of the lengths of the three longest sides divided by the length of the shortest for each of the two copies. For these measures the "open" square (Fig. 1) was regarded as being a closed figure with 4 sides. If one of these measures correlated significantly higher with the Diagonals Measure than the other one it would be the more important determinant of the Diagonals Measure.

As in the case of the Diagonals Measure there was one Organic (the same individual) whose reproduction could not be measured. Both he and the matched Functional were omitted from the analysis. Two Organics (one of whom was the same as in the Diagonals study) only produced one copy which could be measured. Their measures were arrived at by doubling the single measures.

(iii) *Results*

The Angles Measure differentiated between matched Organics and Functionals at beyond the 5 per cent. level of confidence ($A = .227$, 13 df). None of the angles taken separately came near to differentiating the groups. The Sides Measure showed no tendency to differentiate the two groups.

The correlation between the Angles Measure and the Diagonals Measure for the matched Organics and Functionals taken together was $.93$, and separately $.85$ and $.92$ respectively ($P < 1$ per cent.). The correlation between the Sides Measure and the Diagonals Measure for the matched groups taken together was $.15$ and separately was $.14$ in both groups, which is not significantly different from zero.

The correlations of the Angles Measure with the Diagonals Measure are therefore consistently and significantly higher than the correlation of the Sides Measure with Diagonals Measure. This suggests that it is the Angles Measure rather than the Sides Measure that is a determinant of the Diagonals Measure.

The validity of the Angles Measure was now further examined.

An Analysis of Variance was carried out using the Organics, matched and unmatched Functionals and Doubtfuls. It seemed unnecessary to carry out the cross-validating procedure independently for each pair of groups as had been done for the Diagonals Measures, as we are now dealing with a correlate of that measure. The Analysis of Variance would be shorter and provide us with estimates of error variance based on the total sample. The F ratio was 8.42 , significant at beyond the $.1$ per cent. level (the F ratio found for the original subjective criteria was 8.82). The Within Variance with 83 degree of freedom was used for the one-tailed t tests, the direction of the differences having been predicted. The means of the Organics and Doubtfuls differed significantly at beyond the $.5$ per cent. level, the unmatched Functionals and Doubtfuls at beyond the 5 per cent. level and the unmatched Functionals and Organics at beyond the $.05$ per cent. level (Table V). As with the Diagonals Measure there was a greater tendency for the means of the Doubtfuls to fall nearer to that of the Functionals than to that of the Organics, as had been predicted.

TABLE V

*Differences found between the Groups by the Angles Measure
by an Analysis of Variance (df=83)*

Groups compared		Group (1)			Group (2)			Diff.	t	P
(1)	(2)	M	SD	N	M	SD	N			
Organics	Doubtfuls	113.43	50.92	14	76.87	34.15	15	36.56	2.73	< .5
Unmatched Functionals	Doubtfuls	56.86	26.54	43	76.87	34.15	15	20.01	1.73	< .5
Unmatched Functionals	Organics	56.86	26.54	43	113.43	50.92	14	56.57	4.99	< .05

The Angles Measure was correlated with the rating-scale scores and significant correlations found in all groups except for the Doubtfuls (Table VI).

TABLE VI

Product Moment Correlations between Angles Measures and Subjective Rating-scores for the Groups

Group	N	r	P %
Organics	12	.80	< .1
Matched Functionals	15	.75	< .1
Unmatched Functionals	43	.41	< 1
All Functionals	58	.58	< .1
Doubtfuls	15	.44	< 10
All cases	85	.63	< .1

Although we have shown that the Angles Measure differentiates the diagnostic groups at the same level of confidence as the rating-scale scores and correlates significantly with them, we had still to find out whether the subjective rating-scores retained a significant differentiating power independently of the objective Angles Measure. An Analysis of Covariance was carried out, holding constant the amount of each score predictable from the Angles Measure and then comparing 58 Functionals with 12 Organics (measurable on both reproductions). The *t* ratio equalled 0.035 which is very far from reaching an acceptable level of significance (Table VII).

TABLE VII

Difference between Organics and All Functionals, on the Subjective Rating-scores, holding constant the Amount Predictable from the Angles Measure

	M	SD	N
Organics	-.2650	2.48	12
All Functionals	+.0284	2.67	58
Difference	.2934	<i>t</i> = .035	70

(iv) *The Emergence of a New Problem*

One point remains to be mentioned concerning Designs A and 4 from which the Diagonals and Angles Measures were derived. The measures on these two designs were combined because they appeared to be alike. However, the ratios of diagonals for Design A correlate only .167 with the ratios of the diagonals of Design 4 ($P > 10$ per cent., $N = 85$). Similarly, the deviation from right angles for Design A correlate .272 with that of Design 4. This correlation, although significant at beyond the 2 per cent. level is still very low.

We have not yet begun an investigation of these low correlations. We can only note that Billingslea (3, pp. 10-11) also found that different measures of what appeared to him to be the same features in copies of the Bender designs failed to correlate. One possible explanation is that these measures are of very small parts of performance and therefore have only low reliability. It is also possible that the Diagonals and Angles Measures are determined differently in each of these designs.

Further investigation shows that the measures on each design make a significant contribution to the variance of the scores which they objectify. Taking the whole sample ($N = 86$) on Design A and 4 respectively, the ratios of Diagonals correlate .313 ($P < 1$ per cent.) and .549 ($P < .1$ per cent.) with the original subjective scores, and the deviations from right angles correlate

·499 ($P < .1$ per cent.) and ·562 ($P < .1$ per cent.). It is clear that each design is contributing something to the subjective scores but doing so for different reasons.

The fact remains, however, that the way in which a subject copies the angles in a diamond-orientated square has little relation with the way in which he copies the angles in an open-ended square which is square-orientated. This finding, if confirmed, might provide a valuable lead for further investigation.

IX. CONCLUSIONS

One of the main outcomes of the study is the fact that we did not succeed in directly objectifying the original subjective scoring criteria. There are three possible explanations of this failure. In the first place it might be due to our own personal inability to deduce the correct forms of measurement from the definitions. When we, with our more experienced eyes, now re-examine our deductions we are inclined to think that there is some truth in this explanation.

In the second place the aggregate subjective score is composed of a number of scores corresponding to different parts of the criteria. Each score might make a small and independent contribution to the differentiating power of the aggregate score. This is supported by the fact that each of the 57 measures which we tried out provided means which were in the expected direction.

In the third place the real reasons why a scorer gives a certain rating to a drawing may not be the same as the apparent reason. That there is something in this argument is indicated by our results. For example, the "Unmeasurability" criterion identified only Organics. This implies that brain-damaged patients tend to produce drawings that are obviously distorted or incomplete. The subjective rater would here have an easy source of valid judgments which do not require a set of relatively complex subjective scoring criteria. Similarly, obvious sources of distortion, such as the disproportionality of the diagonals of a simple design like a square, would provide another source of valid judgments which do not require a set of relatively complex subjective scoring criteria. It might be argued that those who insist on using complex subjective criteria may, in fact, be ensuring that their judgments are determined only by the simplest aspects of human behaviour.

Our main interest, however, lies in our other findings which are:

- (i) Elderly brain-damaged psychiatric patients copy a square less accurately than do non-brain damaged elderly psychiatric patients.
- (ii) This inaccuracy arises primarily in copying the right angles of the square.
- (iii) Between at least two types of squares there is little correlation in the extent of the inaccuracy.
- (iv) The comparative inaccuracy of brain-damaged patients is little affected by age and intelligence which did not differentiate the groups.

We are now subjecting these findings to a systematic experimental analysis to determine in what ways organic patients find it difficult to draw squares. The outcome of this work should enable us to formulate some precise and testable generalizations about the effects of brain damage in elderly patients.

SUMMARY

1. The subjective rating-scale scores of the Bender Gestalt test-records of a year's intake of psychiatric patients over 60, which differentiated organic, functional and doubtful diagnostic groups at a high level of significance, are analysed.

2. Two objective measures, a Diagonals Measure and an Angles Measure, depending on only 2 of the 6 designs used were found. These differentiated the groups at the same high level of significance as the subjective scores.

3. The Angles Measure is shown to account for the differentiating power of the subjective scores.

4. Age, and Intelligence did not differentiate the diagnostic groups.

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THE RELATION BETWEEN NEUROSIS AND PSYCHOSIS: A RE-ANALYSIS

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INTRODUCTION

RECENTLY D. S. Trouton and A. E. Maxwell (7) reported the results of a factorial analysis of 45 variables derived from an Item Sheet used at the Bethlem Royal and Maudsley Hospitals. Their sample consisted of 819 male hospitalized patients aged 16-59 having non-organic psychiatric disorders. The variables included the major symptoms and past history notations of psychotic and neurotic patients. Their analysis yielded six factors, the first two of which were identified as "psychoticism" and "neuroticism". The authors conclude that their findings support the view that the varied symptom patterns of mental illness can be accounted for by these independent components.

An examination of the two-dimensional plots of the orthogonally rotated factors indicated that a much better fit to the data could be obtained if the axes were oblique rather than orthogonal. On *a priori* grounds it would seem plausible to expect that the underlying dimensions isolated in this domain would be correlated. Moreover, there is considerable supporting empirical evidence for this belief in the studies of psychotic and neurotic symptoms reported by Degan (1), Lorr, Jenkins and O'Connor (3), and Lorr and Rubinstein (4).

The goal of the Trouton and Maxwell rotations was to find a transformation "which would yield factors conforming as far as possible to present psychological knowledge and psychiatric practice and at the same time aim at economy of description". The purpose of this study was (a) to re-rotate the original data to a position that would more closely approximate simple structure, and (b) to suggest alternative interpretations of the rotated factors.

PROCEDURE AND FINDINGS

The rotational procedures used were a combination of single plane and ordinary graphical methods. To remove investigator bias the rotations were conducted blind, that is to say, without knowledge of the defining variables.

Table I, the oblique factor matrix, presents the results of the rotations performed. The transformation matrix and the correlations between the first order factors are shown in Tables II and III respectively. For the most part only variables with correlations of .35 or higher with a reference axis will be used in interpretations of the factors.

The first factor, A, is best defined by the following items: motor disturbances, schizophrenic type of thought disorder, delusions (other), hallucinations, thought or memory impairment, socially withdrawn, retarded activity, ideas of reference, mood disturbances (inappropriate or changing), gross disturbances

of weight and food intake, constitutional causes, and denial of symptoms. The dichotomous variable psychotic versus non-psychotic has a correlation of .42 with A. The prominence of the schizophrenic symptoms and the high positive weight of the psychotic notation on A indicate a broad underlying schizophrenic reaction. Moreover, the varied character of the symptoms defining the factor strongly suggest that we have here a second order factor appearing at the first order level. Certainly previous studies have established such distinguishable factors as motor disturbances, paranoid projection, perceptual distortion, and conceptual disorganization (2).

Can factor A be identified with "psychoticism" in general? We may rule out this possibility on a number of counts. A schizophrenic reaction is surely not synonymous with psychoticism. Then, too, there are other parameters implied in the factor matrix that clinicians would contend to be psychotic. Thirdly, two or more second order psychotic factors have been repeatedly identified (1, 2). Fourthly, the correlation of the psychotic variable with factor A accounts only for about 17 per cent. of the total variance. Apparently factor A comprises only a fraction of the total variance of the psychiatric construct of psychoticism.

Factor B represents in part the psychiatrists' concept of psychoneurosis as evidenced by a correlation of $-.52$ of variable No. 2 with this reference axis. Other defining notations are the following: symptoms of over 12 months duration, neurotic traits in childhood, obsessional symptoms (lifelong or episodic), unsatisfactory early life, mood variations before present illness, family history of abnormal personality, anxiety symptoms (lifelong or episodic), compulsive acts and/or obsessive thoughts, work position falling or frequently unemployed, energy output low, and gradual onset of illness. Hysterical symptoms (lifelong or episodic) has a lesser relation to factor B.

Factor B is one of two psychoneurotic factors in the matrix. The presence of such varied symptoms as obsessions, mood variations, anxiety, and hysteria suggest that factor B, like A, is most likely a second order factor at the first order level. The common element that results in factor B seems to be primarily historical; emphasis is on long duration, gradual onset, and family abnormality.

Is factor B synonymous with a general "neuroticism" component? The presence of another psychoneurotic factor in the matrix, factor F, a hypochondriacal reaction, suggests that such an identification is not plausible. The absence of marker or reference variables (through no fault of the author) from other known neurotic syndromes (5, 6) would also preclude the isolation of a central neuroticism factor. Finally, it is known, from at least two reported similar studies, that there are several, rather than one, second order factors. It is assumed here that "neuroticism", if it existed, would appear as a second order factor. There remains the possibility that a third order neurotic factor can be isolated.

The third factor, C, appears to represent an acute situational depression in younger patients (less than age 40). It is best described by severe insomnia (any time during illness); compulsive acts and/or obsessive thoughts; gross disturbance of weight and food intake; suicidal feelings, intentions, or attempts; a family history of psychosis; and judgment that constitutional causes are important or dominant. Other symptoms correlated with C (less than .35) are agitated; depressed; and delusions of guilt, self-reproach, and unworthiness. The negligible correlation of the psychotic versus non-psychotic dichotomy with factor C suggests that the examining psychiatrist was uncertain how to classify such patients.

The notations characterizing factor D are irritable, impulsive and/or aggressive, mood variations before present illness, suspicious, anxiety symptoms (lifelong or episodic), overactive or excited, agitated. The correlation of .20 of the psychotic versus non-psychotic dichotomy suggests that this pattern is likely to be labelled "psychotic". The underlying parameter is not too clear but it is similar to the Lorr, Jenkins, O'Connor (3) belligerence factor and the Degan irritability factor (1).

Factor E is clearly a retarded depression. Defining E are notations of socially withdrawn, depressed, delusions of guilt and self reproach, lacks self confidence when in society, retarded activity, and compulsive acts and/or obsessive thoughts. Variables showing lesser correlations with E are suicidal feelings, anxious, unsatisfactory adolescent adjustment, and absence of over-activity. It is also of interest to note that variable No. 45, recovered or much improved at discharge, has a positive correlation of .21 with E. As in the case of C, acute situational depression, the interviewer is ambivalent as to whether the patient is psychotic or psychoneurotic.

The last factor, F, represents a hypochondriacal reaction. Correlated with F are hypochondriacal attitude toward illness, other functional disturbances, anxious, hysterical symptoms (lifelong or episodic). Other variables showing minor correlations with F are consistent in suggesting an anxious preoccupation with somatic complaints.

The correlations between the factors are shown in Table III. Because the planes were ill-defined in a number of places the correlations cannot be supported with much confidence. However, two independent second order factors, shown in Table IV, were extracted by the multiple group method. Both are bipolar. The first is defined by the schizophrenic reaction (A) and belligerence (D) at one pole and by acute situational depression (C) and hypochondriasis (F) at the other pole. It is very similar to Degan's factor Y, which he calls paranoid-depressive. Factor Y is defined by his first order factors neurasthenia and depression versus hyper-irritability and hyper-projection. This suggests that two opposing defence mechanisms are in operation; i.e. projection versus introjection.

The second bipolar factor opposes the psychoneurotic factor B to retarded and acute depression (E and C). Perhaps this represents the opposition of an illness of long duration and one of short duration.

TABLE I
Oblique Factor Matrix
(Decimal points are omitted)

Item	Description	Factors					
		A	B	C	D	E	F
1	Age (16—39) vs. (40—59) ..	—16	—05	50	—14	—21	—21
2	Psychotic vs. non-psychotic ..	42	—52	06	20	—01	—08
3	Family history of psychosis ..	19	16	35	05	18	—18
4	Family history of neurosis ..	01	18	—18	—01	26	30
5	Family history of abnormal personality ..	—02	42	11	17	00	01
6	Unsatisfactory early life ..	—03	45	04	20	15	11
7	Unsatisfactory adolescent adjustment ..	11	30	—30	21	32	27
8	Work position falling/frequently unemployed ..	17	38	—10	05	—06	17
9	Lacks confidence when in society ..	19	24	—19	05	52	19
10	Unsatisfactory home life as an adult ..	—21	27	32	05	23	—05
11	Neurotic traits in childhood ..	16	46	07	11	—04	27

TABLE I—*continued*

Item	Description	Factors					
		A	B	C	D	E	F
12	Hysterical symptoms, lifelong or episodic	-12	32	-11	17	-18	38
13	Obsessional symptoms, lifelong or episodic	28	46	14	19	14	-01
14	Anxiety symptoms, lifelong or episodic	-31	42	05	35	22	27
15	Mood variations before present illness	-18	45	23	43	14	-14
16	Energy output low	27	36	-13	-07	10	26
17	Symptoms of over 12 months' duration	01	55	-03	00	-04	09
18	Gradual onset of illness	02	35	18	18	21	-22
19	Constitutional causes important or dominant	39	33	35	-01	16	-07
20	Precipitative psychological and social causes unimportant	25	-07	25	-21	-01	-14
21	Other functional disturbances	-01	-02	-07	-08	-08	55
22	Retarded activity	47	-02	25	-03	54	-04
23	Overactive, excited	28	-17	20	32	-30	-02
24	Agitated	02	-08	33	35	02	13
25	Impulsive and/or aggressive	31	03	14	49	-07	-03
26	Socially withdrawn	54	00	-10	03	66	19
27	Compulsive acts and/or obsessive thoughts	30	43	44	05	37	14
28	Motor disturbances	73	05	04	06	04	09
29	Depressed	-10	01	29	21	61	00
30	Anxious	-23	-04	-09	16	31	43
31	Mood disturbances	45	01	-02	34	-06	09
32	Suspicious	28	-14	-02	43	16	08
33	Irritable	-04	03	-03	51	07	06
34	Suicidal feelings, intentions, attempts	05	09	39	30	32	-14
35	Schizophrenic type of thought disorder	68	-16	-11	00	11	-13
36	Thought or memory impairment	53	-05	09	09	17	19
37	Delusions of guilt, self-reproach	13	-09	28	30	56	04
38	Ideas of reference	40	-33	-28	17	29	08
39	Delusions (other than in Items 37 and 38)	55	-28	-02	15	15	16
40	Hallucinations	53	-29	-17	17	05	17
41	Severe insomnia any time during illness	05	00	49	24	07	11
42	Gross disturbance of weight, food intake	41	09	40	-08	20	05
43	Hypochondriacal attitude toward illness	03	-02	00	01	-06	60
44	Denial of symptoms	35	19	06	04	-22	-32
45	Recovered or much improved at discharge	-31	-28	16	-01	21	-18

TABLE II
Transformation Matrix
(Decimal points are omitted)

	A	B	C	D	E	F
I	38	-38	26	38	31	-20
II	-04	58	17	58	48	54
III	11	15	-48	24	-27	00
IV	58	02	-44	-66	27	51
V	67	10	50	-05	-66	20
VI	-23	70	48	-15	30	-60

TABLE III
Correlations of Primary Factors

	A	B	C	D	E	F
A	1.00					
B	.. - .02	1.00				
C	.. - .43	.. - .30	1.00			
D	.. .43	.. .02	.. - .42	1.00		
E	.. .11	.. - .29	.. .08	.. - .10	1.00	
F	.. - .37	.. - .12	.. .50	.. - .24	.. - .00	1.00

TABLE IV
Second Order Factor Matrix F
(Decimal points are omitted)

	X	Y
A	.. 64	-23
B	.. 16	53
C	.. -72	-23
D	.. 59	01
E	.. -02	-54
F	.. -62	01

DISCUSSION

As Trouton and Maxwell point out, the basic data are distinctly limited. The symptoms do not represent a description of the patient over a uniform period of time. The symptoms included do not adequately represent all of the major diagnostic categories. Some symptoms are combined with their opposites and few terms are defined. Finally, degree of rater agreement and systematic bias are unknown. To these limitations should be added the absence of sufficient reference variables to define other factors likely to be present. For example, in the absence of two or three distinctive variables to define a paranoid pattern, no common paranoid factor can appear, although one may be present; it is lost in the unique variance. Undoubtedly this is one reason for the appearance of second order factors at the first order level.

Is an orthogonal reference frame the most suitable approach to the isolation of such general parameters as "psychoticism" and "neuroticism"? In the cognitive domain the concept of a second order factor has been found to be fruitful in bringing together the Spearman notion of a general intellectual factor and the Thurstonian group factors. In the domain of psychopathology there is also evidence that second order factors isolated are meaningful and stable. There is substantial agreement between Degan (1) and Lorr *et al.* (3) despite differences in populations sampled and rating scales utilized. It would seem preferable to permit the data to dictate the angle between planes. An analysis of the correlations between the primary factors should then reveal any more general second order or third order parameters.

SUMMARY AND CONCLUSIONS

The centroid factor matrix reported by Trouton and Maxwell in a study of 45 variables taken from an Item Sheet used at the Bethlem Royal and Maudsley Hospitals was subjected to a re-analysis. The six factors were re-rotated obliquely with the object of attaining simple structure.

The first two rotated factors were interpreted as a broad schizophrenic reaction and a psychoneurotic factor with emphasis on long duration, gradual onset, and family abnormality. It was hypothesized that both are second order factors appearing at the first order level. The remaining factors were interpreted as an acute situational depression, a retarded depression, a hypochondriacal reaction, and a doubtful belligerence factor.

It is concluded that "psychoticism" and "neuroticism" factors have not been established.

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AN INVESTIGATION, BY MEANS OF THE OBJECT RELATIONS TEST, INTO SOME OF THE EFFECTS OF EARLY SEPARATION FROM THE MOTHER ON THE PERSONAL RELATIONSHIPS OF ADOLESCENT DELINQUENT GIRLS

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A GROUP of adolescent girl thieves have been examined by means of the Object Relations Test, in an attempt to estimate some of the psychodynamic factors determining their thieving. These girls are all at an Approved School where psychiatric treatment is given. They are all of average or superior intelligence and from materially good homes and their delinquency has been considered to be neurotic in origin. The age range is from 15 to 19 years.

A survey had previously been made (1) of the family backgrounds of all the girls who had been committed to this school and it was found that 37 per cent. of the thieves had suffered uninterrupted separations of six months or more from their mothers in the first five years of life. This result confirms Bowlby's finding (2) and raises the question as to whether there is a special kind of psychopathology underlying the thefts of children who have suffered early separations. The majority of the girls who had had this experience were considered clinically to be of an affection-impaired or psychopathic character and to lack the capacity for making deep emotional bonds. The term "affectionless" is, however, considered to be arbitrary and over-simplified and an attempt has been made to measure, with a greater degree of objectivity and precision, some of the differences in personality pattern between a group of adolescent girl thieves who had suffered early separations and a comparable group who had not.

The test used is that due to Phillipson and described and discussed fully by him (3). It consists of a series of twelve shadowy and ambiguous pictures in which one, two, three or more persons may be discerned. Detail is very indefinite and there is little to indicate the sex or age of the persons or their activities, feelings or relationships to each other. The test differs from Murray's Thematic Apperception Test in that the vagueness of the stimuli evokes a higher degree of imaginative response and also in that the pictures are planned on a theoretical basis to release phantasies of various kinds of object relationships. The Kleinian school of psycho-analysis has demonstrated the existence, within the personality, of an inner world of objects and object relationships, which determines in a fundamental way the nature of the emotional bonds which an individual is able to form with other persons in his external world. This series of pictures is designed in such a way that basic patterns of personal relationship may readily be projected into them. The subjects are presented with each picture in turn and asked to "feel themselves" into it, to imagine what situation it could represent and then to make up a brief story saying what led up to this situation and what happened in the end. The great majority of girls entered eagerly into this test. On the whole, it was found that the more

deeply disturbed children were more fluent, original and zestful than the relatively normal, who tended to be more prosaic in their utterances.

Various groups of delinquents have been tested in this way and results have also been obtained from a control sample of forty non-delinquent adolescent girls of the same age, from secondary modern and technical schools, whose results have been reported on briefly elsewhere (3). Wide qualitative and quantitative differences have been found between different kinds of delinquents and especially between delinquents as a whole and the control group, and these comparisons will be reported in a later publication. It is hoped that this test might help in diagnosing the various personality problems of delinquents and in deciding upon the form of treatment to which each is most likely to respond.

The present paper is concerned only with some of the quantitative differences in test results which seem to be attributable to the separation experience. Results of forty-four adolescent girl thieves have been analysed in detail; Group A* consists of twenty-two thieves who have experienced uninterrupted separations of six months or more from their mothers during the first five years of life and Group B of twenty-two thieves who have not, as far as is known, been separated from their mothers before adolescence. Since these two groups are comparable in age, intelligence, general background and type of offence and all are undergoing the same treatment in the same school, it seems that any significant differences between them may reasonably be attributed to the effects of the separation.

The two groups do not differ in the magnitude of their thefts, which range from determined housebreaking to very petty pilfering and, indeed, the Group B children seem rather more commonly to have committed major thefts at adolescence. They do differ significantly, however, in that the records of Group A children show an earlier onset and a greater persistence in theft; in one half of these cases there has been petty pilfering from a very early age, whereas the great majority of the Group B children have kept clear of this kind of trouble until the pre-adolescent years or later. Thirteen of Group A and nine of Group B are sexual delinquents as well as thieves, and promiscuity seems to be rather more common in the former. Reports of aggressive behaviour and of truancy from school appear rather more often in the records of the separated children, who present a general picture of variegated misbehaviour over a long period. The hypothesis adopted is that breakdown in the relationship to the mother at an early and crucial phase of development may result in an impaired capacity for making good relationships of any kind. The object relations technique has been used in an attempt to check and elaborate this hypothesis.

The main value of this test, as probably of most projection tests, lies in the qualitative insight which it gives into the inner world of the individual. For therapeutic purposes, records are analysed on the assumption that a subject will tend to project into the cards those patterns of personal relationship which his earlier experience has taught him to expect in life. The record of each delinquent has therefore been considered in relation to her case history, in an attempt

* The ages at which separations occurred are as follows:

First year	..	..	..	7
Second year	..	..	..	9
Third year	..	..	..	3
Fourth year	..	..	..	3
Total	..	..	..	22

In thirteen cases the separations were permanent and in the remainder of cases they extended over periods of 2½ to 10 years, interrupted by occasional visits.

to understand how her methods of responding to people in the present have resulted from those which she might have been obliged to use in the past. The test has been found useful as a guide to therapy, by throwing some light on the psychodynamic linkage between present anti-social behaviour and reactions to earlier deprivation. Interpretations in this sense, however, are bound to be highly subjective and to depend upon more or less intuitive judgments, which are almost impossible to validate.

In personality studies generally, there is always a multiplicity of hypotheses which are logically tenable and from which one takes one's choice according to temperament, experience and training. For research purposes we have to be concerned with systematic attempts to test them. In the present paper an attempt has been made to evaluate the material primarily on a strictly objective and quantitative basis. Statistical comparisons can then be made between the groups and significant differences which are found have the validity of scientific evidence rather than opinion; thus a basic factual framework may be discerned, against which the hypothesis may be checked.

In analysing the test records, the first line of enquiry has been into the nature of the imaginative population which the subject evokes in response to the complete set of cards. What are the numbers and characteristics of the persons introduced into the stories? How does the subject people her world? Secondly, we have to consider the quality of relationships between the inhabitants of this imaginary world and thirdly, the conditions under which such relationships occur. Using such a frame of reference, it is often possible to gain a relatively good insight into some of the dominant characteristics of the individual's inner world of objects and object relationships, though such findings are sometimes inconclusive. In comparing fairly large groups on a quantitative basis, however, differences in general trend stand out to an extent which is undoubtedly significant.

The first line of enquiry is the most fruitful from the point of view of scientific proof, since it depends upon objective enumeration and also since the numbers are large enough to be amenable to statistical treatment. The present paper will be restricted to a study of the material on this level.

Turning, then, to the nature of the imaginative populations, a "census" can be taken simply by counting the characters introduced by a subject in response to the whole series of twelve cards. In making this "census", groups have, at the present stage, been omitted, since it is often difficult to assess how many groups are operating in one story. For the purpose of definition, two persons acting together are counted as two persons, whereas three or more acting together are considered as a group unless some remark is made to differentiate one from the others. Some valuable material may have been lost by this arbitrary restriction, but it was not possible otherwise to be numerically precise. Further, the psychological significance of an undifferentiated group is probably less, and certainly different from that of an individual who stands out as a personal character.

The test is designed with the intention that three cards shall represent each of these four arrangements: one-person, two-person, three-person and group situations. This makes a total of eighteen figures which are normally perceived in the first three kinds of card and, in addition, varying numbers of figures may be picked out and individuated from the group scenes. Other figures may also be perceived on several of the non-group cards and there are occasional failures to perceive certain figures at all. The average number perceived by Group A is 24·3, by Group B 23·7, and by the control group 23·6, so that

there is an overall average of approximately 24 perceived figures, but with a range from 18 to 30.

In addition to the persons seen in the cards, there is also a varying number of purely imaginary characters who are introduced into the stories. It is always quite clear whether a figure is actually perceived in the card and can be pointed out or whether he is felt to be "off stage" and when there is any doubt the subject is asked "Can you see him there?" It seems as if there is an important distinction between the psychological processes which determine these two kinds of projection. In a sense, there are two populations, emerging from different levels of consciousness, one of which is projected directly into the cards and which may be called the "perceived" population and a further "invented" population, which seems to be elaborated in order to resolve the "perceived" situations. The perceptions are determined partly by the reality content of the cards and partly by the inner needs and expectancies of the subject, while the inventions are purely imaginative acts, with no direct dependency on an external stimulus. The difference is somewhat comparable to that between controlled and free association and it seems possible, therefore, that the inventions may emerge from a less conscious and reality-based level of awareness. In some very disturbed patients there are quasi-hallucinations of human figures in abnormal areas of the cards, but these are very rare in the non-psychotic groups under discussion and have for the present purpose been scored as inventions. Some of the characteristics of "invented people" will be discussed later and some suggestions will be made as to their function in relieving tension.

Characters can also be classified quite objectively according to sex. Sometimes a subject will change her mind in the course of a story as to the sex of one of the figures and in a few cases, it is clear from the context that these ambiguities are meaningful. There are too few of these figures to yield conclusions and for scoring purposes they are counted as two persons.

Table I shows the average numbers of characters of each sex perceived and invented by the two groups in response to the whole series of twelve cards.

TABLE I

Average Number of Characters Introduced

		Male		Female	
		Perceived	Invented	Perceived	Invented
Group A	..	16.55	11.41	7.69	6.18
Group B	..	13.91	6.54	9.82	5.59
Difference	..	+2.64	+4.87	-2.13	+0.59

It is seen that Group A both perceive and invent more men and that they perceive less and invent slightly more women. Since the differences are most marked in column 2 and least marked in column 4, these figures suggest that two or more factors may be operating independently. These relations may conveniently be sorted out by means of an analysis of variance, which shows that Group A differ from Group B in three respects; they introduce firstly, a greater number of figures generally ($p < .01$), secondly, a greater proportion of men to women ($p < .001$), and thirdly, a greater proportion of invented to perceived characters ($p < .05$). The difference in the proportion of men to women between the groups has a chance probability of less than one in a thousand and is undoubtedly significant; the difference in total numbers of

characters introduced is also highly significant and there is strong suggestive evidence that a greater proportion of Group A characters are inventions, which are not directly evoked in response to the reality stimulus.

In analysing the results of delinquents, characters can also be classified according to the ethical judgments which are made or implied about them. Delinquents seem typically to depict their *dramatis personae* on melodramatic lines as all black or all white, with rather few shades of grey, so that "When they are good, they are very, very good and when they are bad, they are horrid". Thus figures can readily be sorted into "good", that is, benign or harmless, "ambivalent", where the moral attitude taken towards them is mixed or indecisive, and "bad", with unqualified disapproval. This crude fairy tale quality is also found, though to a lesser extent, in the control group of non-delinquents of the same age and in some very disturbed adults and may be taken as an expression of immaturity. A related phenomenon is the "splitting" of principal characters into those who are purely virtuous and those who are purely villainous, with the classical uncompromising struggle between the forces of good and evil. Examples of the various ethical categories are given below:

1. A good father-figure. Response to Card A2, a two-person situation most usually seen as lovers.

"It is late at night. These two girls have just come to a door. They had been for a hike on the moors and got hopelessly lost, because their compass had gone wrong. They just went walking on. At tea-time they still didn't know where they were. They were getting worried. As it got dark, they went walking on, hoping to get somewhere. Then they came to the cottage of an old shepherd and he took them in and gave them supper and they stayed the night. In the morning, it appeared they had just been walking round and round in circles, getting nowhere."

This story was given by a girl who had been separated from her parents from age 3 to age 9. She was promiscuous and a thief and had a record of aggressive behaviour, truancy from school and petty pilfering from age 7. Phantasies of being lost are frequent in the records of very disturbed delinquents; she interpreted the card as two girls in this plight and invented a kind fatherly old man "off-stage" to resolve the problem.

2. An ambivalent heroine. Response to Card C2, a two-person situation usually seen as someone going into a room to care for a person who is in bed.

"A woman in a fur coat. She looks Russian, by the hair. She is walking out very furtively as if she has done something very wrong. And there is someone in bed—another woman, her friend. She has put her friend's coat on. She is coming out of the room. She is looking behind her to see that no one is looking. She has given her friend a sleeping drug. She has taken her money and she is going to leave the country. She likes her friend, but she is the only possible person she can think of—the only way to leave the country. She is poor and she wants to get away from poverty and live in a new country. She has left the door open because she doesn't want to close the door on their friendship."

This story was given by another girl who had suffered a prolonged separation from her mother during infancy. Her thefts were characteristically from her mother or from mother substitutes and culminated in a major theft in collaboration with a boy, with whom she absconded. This story perhaps reflects some of the feelings she may have experienced in doing so.

3. A bad heroine. Response to Card B1, a one-person situation, which is normally seen as someone going to bed or alternatively as a parent going to tuck a child up for the night.

"There's an imaginary person in bed I can't see. I can't see the murdered person. She is in a flat and this person coming upstairs is from another flat. She is coming up to bed and sees this door open and wonders why it is open. I'm trying to think out why she should have been murdered. The only reason I can think of is jewels, but the apartment looks too poor. The lady coming upstairs decides to see why the door is open, so she walks in. She calls the name of the person in bed, but gets no answer. So she turns the light on and goes over to her. She finds she has been strangled, so she goes downstairs and sends for the police. I've got a funny idea now. This one that's been murdered is very like Marilyn Monroe and she's been taking people off Marilyn Monroe and making them like her instead. So Marilyn Monroe went to the flat and murdered her. The police started investigating and found that this girl had always been Marilyn's enemy. So they questioned her and in the end she confessed to murder. She was put in prison for a few years and her contract was withdrawn with the film producer. So in the end, instead of getting more fame for herself, she didn't get any at all. I hate Marilyn Monroe. She's worse than Jane Russell. There doesn't seem to be any good looks about either of them."

This story was given by an illegitimate girl who was adopted at 21 months, by extremely neurotic parents. Her pilfering was very mild, but she had been in some trouble with boys and was also homosexual. The story, which was told with much pleasurable excitement, is a very crude and forcible expression of feminine "cattiness". She assumed that the picture was intended to represent a murder. The perceived figure is benign, but a corpse and a murderess are invented, on the principle of "splitting". The murder seems to have been to some extent condoned, since little affect is expressed concerning it and the penalty is unusually light.

4. A "split" father-figure. Response to Card CG, which is normally seen as a crowd cheering, or alternatively, attacking a leader.

"One day a man was giving a speech and the crowd was listening. Those who were with him tried to protect him from those who were against him. They were Indians and wanted an Indian and not a white man to rule them. He wanted to train a clever young Indian to take over the job, but they wanted an Indian right away. The white man said there wasn't anyone of you clever enough for the job. 'Those who don't want me form their own group and move away.' But hardly anybody wanted him, only a small group. One night the hostile group kidnapped him. His followers couldn't think how to get him back. They wanted him because he was clever. The others said 'If there is a war, we have to fight for the whites in any war, and we don't want to'. In the end, the minority gave in and the man was sent back to England, and they had a black leader. The black leader couldn't manage to keep the peace, so he sent for the white man again. The same man refused to come, but another white leader came instead, and all was peace. They agreed that they had to have a white leader to keep them in order, though they would prefer a black one."

This story was given by a very much rejected girl, with a history of petty theft, enuresis, food fads and nightmares. She was not a sexual delinquent, but had an antipathy to men. In this story she expressed her strongly ambivalent feelings towards an authoritarian father, by means of "splitting" and a compulsive oscillation. The central figure was "good", but an assortment of "good" and "bad" substitutes were invented and worked through before reaching a final compromise.

In the last story there was a resort to violence, although no one was actually injured. As might be expected, violence is a frequently recurring theme in the

records of very disturbed delinquents and this may be partly a reflection of their immaturity and of the crudeness of their emotional expressions. A greater proportion of figures suffer death, illness or injury in the stories of the delinquents than of the non-delinquents and of adolescents than of adults. The two groups under discussion differ significantly in that Group A gave a much higher "Casualty rate" among men;* the average number of their stories in which men are dead or injured is 3·6, that is to say, nearly one-third of their stories contain a reference to this theme, which appears to be a dominant preoccupation. The corresponding figure for Group B is 2·3, which is significantly less at the 1 per cent. probability level. The "casualty rate" among women is the same in both groups, namely, 2·4, so it seems that Group A girls tend specifically to phantasy attacks on men.

In analysing the records of delinquents a further useful category consists of figures who are presented as "good", but who are dead or incapacitated in some way. Since their "goodness" is contingent upon their punishment, they may also be considered as ambivalent characters, who can be imagined with pleasurable sorrow. For example:

5. A good, injured heroine. Response to Card A1, normally seen as a man, either alone or with another figure, usually female.

"A vicar in a church. A woman kneeling down at the side and she is praying. He asks her what she is praying for. She tells him that it is Christmas time and that her little girl has been run over and can't walk because of her leg. He asks her why she has come to church to pray. She says she has never been in a church before, but people have told her how good God is to everyone who asks, and her little girl is going into hospital for a big operation and she wanted Him to see that she came through all right. She went there every day and night for a week, praying and crying, and one day she came rushing in to him and she told him that the operation had worked and God had made her little girl walk again."

On this card, a man and a woman were perceived, as normally, but the central character was the little girl "off-stage" who had come to grief through violence. A loving relationship between mother and daughter was imagined on condition that both suffered considerably. This story was given by a sexual delinquent who was also a mild pilferer. She had never been separated from her parents, but had been very much rejected in favour of a delicate younger sister, who had had much hospital treatment.

It is found, in practice, that the *dramatis personae* of adolescents and of very immature adults, can easily be classified into these four kinds: good, good but injured, ambivalent and bad. In some cases, a character is presented as "good", but with some insincerity or undercurrent of negative feeling, which can be sensed but not scored. For the purpose of statistical treatment only manifest content can be considered, and statements have to be taken at their face value. It should be stressed that this method of scoring is not applicable to the records of more sophisticated subjects.

The total numbers of figures of each kind introduced by the two groups are shown in Table II.

It may be a matter for surprise that so high a proportion of the characters introduced by very disturbed delinquents should be benign, but this category includes conventional stereotypes, who may be referred to in passing, but who

* "Casualty rates" are based on the inclusion of undifferentiated groups, e.g. "all the other sailors had been drowned", so they are not expressed as a proportion of the total population scored.

TABLE II

Ethical Classification of Characters

		Good	Good- injured	Ambi- valent	Bad	Total	N.
		%	%	%	%	%	
Group A	Perceived ..	68	7	6	19	100	532
	Invented ..	52	21	5	22	100	389
Group B	Perceived ..	75	8	6	11	100	522
	Invented ..	58	19	7	16	100	268

do not participate in positively good relationships, in addition to the glossed characters referred to above.

It seems meaningful to reduce this classification to "good" and "other" according to whether some negative phantasies are expressed about these people. If this variable is introduced into the analysis of variance, we find some reason to suppose that Group A populations generally may be somewhat more sinister than Group B populations, but this difference barely reaches the 5 per cent. probability level, and cannot, therefore, be of major importance. In comparing perceived with invented populations, however, the invented populations are found to be significantly more sinister in both groups, with a chance probability of less than one in a thousand: 71 per cent. of perceived characters are "good" as compared with 54 per cent. of invented characters.

Thus two differences have been found between the perceived and invented populations: invented populations are firstly more numerous in the stories of the separated children and secondly more sinister in general. On reading the material, one gets the impression that invented characters have a lesser degree of psychological reality than perceived characters and that the subject is seldom identified with them. It is suggested that children of the affection-impaired type may tend especially to work out the problems which they project into the cards, by means of an *ad hoc* proliferation of figures, who have the unrealistic quality of puppets or stereotypes. It is interesting to speculate that this type of test behaviour may be correlated with a type of life behaviour in which there is a multiplicity of superficial relationships, but great difficulty in forming any at depth. Examples will be given from the records of two psychopathic girls in Group A, who were both sexually promiscuous and persistent and indiscriminate pilferers.

1. Response to Card C3, which is normally perceived as an elderly couple with a son or daughter. The subject is a girl aged 17 years with an I.Q. of 120.

"The time is the beginning of 1945. Mr. and Mrs. Jones are sitting round the fire when there is a knock at the door. It's her son, Bert, who says he is on sick leave from a shrapnel wound. He was cold, so Mrs. Jones made him sit by the fire while she got him some tea. There is a knock at the door. Bert jumps up. Mr. Jones says, 'You are nervous'. He answers the door and a man is there, who comes in and says 'Your brother has deserted from the Army. He stole something and got scared, so he ran away.' She says to her son, 'Whatever did you do it for? You have never done such a thing before.' He says he was going out with a girl friend and wanted money to get her an engagement ring. So he stole a vase from an officer's room. So he was taken away to be court-martialled. But it turned out he stole the vase because he was being blackmailed and when it all came out, he was let off. The blackmailer had found some letters from his ex-girl friend and threatened to give them to his new girl friend. Also he had forged some papers showing he was married."

Here three figures were perceived in the normal way, but an additional three men and two women were fabricated for the working out and glossing of the paranoid theme, with "splitting" of both a man and a woman, while conflict was shown by a degree of intellectual confusion not compatible with an I.Q. of 120.

2. Response to Card B2, normally seen as a courting or married couple. The subject is a girl aged 18 years with an I.Q. of 104.

"These two people are watching a certain window in a house. The room they are watching belongs to an old professor, who has some very important plans. These two men have been told they have got to get them. These two fellows are very young, but they are doing it for someone to get them the money to get them out of trouble. They don't really want to harm the professor in any way. They are watching to see if he will go out, so they will have a chance to get in the room. They saw the old professor go out and made their way into the house and went into the room where he had been. But as they got to the door of the room, they both decided they couldn't do this job, but would go to the police and tell them everything. They went straight to the police station and told what they had been trying to do. But they were frightened to tell the police who they were working for. The police inspector told them not to worry, they would guard them. So they told who they were working for and the police went and picked him up. When he saw the two boys, he tried to put everything on them. But the police said they had been looking for him for quite a while for many things. He was charged and the inspector warned the two boys to try to keep out of trouble, because once they started that kind of thing it would be hard to stop it. They thanked him for his advice and went away."

Here there was an abnormal perception of the couple as two boys and the paranoid theme was worked out through the medium of three invented father-figures, one a persecutor, one a victim and one a police inspector.

In general it appears that where two or more invented characters are introduced into a story, the situation under discussion is representative of some special stress, which the subject is attempting to deal with by paranoid projection, usually with splitting of one or both parent-figures. It is hoped to elaborate this point further in a subsequent paper, where the function of invented characters will be considered in various kinds of relationships. The hypothesis put forward to account for the excessive numbers of characters introduced by Group A is that these children have difficulty in forming real personal bonds, but are inclined to work out their emotional problems on other people indiscriminately, thus repeating a pattern which was forced upon them in their early childhood.

We will now consider the other main statistical difference between the imaginative populations of the two groups, namely the excessive proportion of masculine figures introduced by the Group A children. This difference is very marked, with a chance probability of less than one in a thousand. The sex bias may be scored by subtracting the total number of feminine characters from the total number of masculine characters introduced into the record. The mean score of Group A children is 14·1, of Group B children 5·0, and of the control group 6·5. A score of 14 or more is given by thirteen of the twenty-two Group A children, by one of the Group B children and by none of the controls. It seems, therefore, that a very high score on this variable is a fairly reliable basis for diagnosing, on blind analysis, that an early separation had occurred, which has affected personality development. It is also found, in practice, that a high score is a poor prognostic sign; the two highest on record, namely 25 and 24, were given by two of the school's worst failures, psychopathic girls who were

later committed to Borstal for further offences after their discharge; while the remaining five children in this series, who were in further trouble for theft after leaving, all scored abnormally high.

Fifteen of Group A have been retested after an interval of six months or more, when an apparent improvement in personal relationships and behaviour has been reported by the staff, and a comparison of first and second test results is shown in Table III below.

TABLE III

Number of Male minus Number of Female Characters Introduced

Case	First test	Second test	Difference
1	+24	+ 4	-20
2	+21	+10	-11
3	+18	+11	- 7
4	+18	+ 8	-10
5	+17	+26	+ 9
6	+17	+11	- 6
7	+17	+ 4	-13
8	+16	+11	- 5
9	+15	+ 8	- 7
10	+14	+ 3	-11
11	+12	+12	0
12	+ 9	+ 4	- 5
13	+ 9	+11	+ 2
14	+ 9	+ 3	- 6
15	+ 9	+14	+ 5
Mean	+15.0	+ 9.3	- 5.7

It will be seen that, on retest, there is a significant reduction in mean score, which now approaches that of the controls. Scores are reduced in eleven cases, the same in one and increased in three. Differences are most marked, on the whole, in those cases where the initial score was very high. Retest results of Group B girls, whose scores were normal on the first test, do not show any significant change, so that the effect cannot be attributed to a prolonged stay in a predominantly feminine environment. It seems, therefore, that whatever the personality disorder may be which underlies these high scores, it may be amenable to treatment in the school. The hypothesis which will be set up to account for them is that they result from a breakdown in the identification with the mother at an early and crucial phase, which has made it especially difficult to adjust satisfactorily in a feminine role. Scores of +19 and +17 were made by two of the promiscuous Group A girls who were also overtly homosexual and there is clinically some reason to suppose that many of this group are abnormally boyish in their behaviour, a conclusion which is compatible with school records of truancy and aggressiveness.

SUMMARY

A quantitative comparison has been made of the Object Relations Test results of two groups of adolescent girl thieves; Group A, who had experienced separations of six months or more from their mothers during the first five years of life and Group B who had not, as far as is known, experienced such separations before adolescence. Since these two groups are comparable in age, intelligence, general background and type of offence and all are undergoing the same treatment in the same school, it seems that any significant differences between them may reasonably be attributed to the separation experience. The majority of Group A were considered clinically to be of an affection-impaired type. Reports of an early onset of thieving, aggressive behaviour, truancy from school and sexual promiscuity at adolescence

occur rather more commonly in the histories of Group A than in those of Group B; though the numbers are too small to exclude chance, the former group seem to present more commonly a general picture of variegated misbehaviour over a long period. The Object Relations technique has been used in an attempt to explore the psychopathology of the thieves who had suffered early separations by establishing measurable differences in personality pattern between them and a comparable group of thieves who had not had this experience. It was hoped in this way to establish a basic framework of scientific fact against which various psychological hypotheses may be checked. There is, of course, a considerable overlap between the groups and wide individual differences are found within them; but by comparing fairly large groups on a statistical basis, characteristic patterns stand out to an extent which is undoubtedly significant. The following significant differences have been found:

1. Group A introduce a greater number of characters into their stories and invent abnormally large numbers of purely imaginary persons, who have no direct relationship to the reality content of the cards.

2. "Invented populations" are not only more numerous in the stories of Group A girls, but are also more sinister than perceived populations in both groups. Negative feelings are expressed with regard to 46 per cent. of the invented people as compared with 29 per cent. of those who are perceived.

3. Group A introduce a greater proportion of men to women into their stories than do Group B. This difference is very marked and it seems that a greatly excessive number of male characters is a fairly reliable basis for diagnosing, on blind analysis, that an early separation has occurred, which has affected personality development.

4. The "casualty rate" among men characters is much higher in the stories of Group A than in those of Group B, though the corresponding rates for women characters are the same.

The hypothesis put forward to account for findings 1 and 2 is that Group A children are more inclined to work out their emotional needs by means of an indiscriminate paranoid projection on to other people. It is suggested that this mechanism may be a residue from an early childhood in which there was no stable object of affection.

The hypothesis suggested to account for findings 3 and 4 is that a breakdown in the relationship to the mother at an early and crucial stage of development could result in a failure to make a satisfactory feminine identification, so that strong identifications are made with men who are imagined in an intensely ambivalent role.

Further work has been done on a more detailed analysis of the material, in terms of the conditions under which various kinds of relationships are imagined, and results seem to confirm the hypotheses suggested above. Evidently the subject matter is exceedingly complex and any conclusions drawn from this limited amount of evidence are bound to be highly speculative. It is clear, however, that there are quantitative differences between the two groups under discussion, though readers might wish to devise alternative explanations to account for them.

Eleven of the fifteen Group A children, who have been retested, show reductions in their abnormally high sex ratios and it seems that whatever the personality disorder may be which underlies these high scores, it is amenable to treatment in the school. A more detailed comparison of test and retest results is being undertaken at the present time, in the hope of throwing some light on the dynamics of those improvements in relationship which have been made, as a result of psychological and environmental therapy received in the school.

It is hoped that this test might be of use in diagnosing some of the personality problems of delinquents and in the selection of cases who are most likely to benefit from psychotherapy.

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FACTORS INVOLVED IN DRUG-PRODUCED MODEL PSYCHOSES. II*

By

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THE *Malleus Maleficarum*, the standard textbook of medieval witch-hunting published in 1484 (2), already mentions that "an illusion of sight and touch can be caused . . . by the summoning to the fancy or imagination of certain forms and ideas latent in the mind", and continues by saying that "(the fifth) method of delusion of the devil is by working in the imaginative power, and by a *disturbance of the humours* effecting a transmutation in the forms perceived by the senses". This might be the first working hypothesis ascribing certain behavioural changes of an apparently schizophrenic nature to biochemical influences.

By the administration of certain drugs we can nowadays duplicate that so-called fifth method of the devil and call it an experimental—or *model-psychosis* (1).

The model psychoses, as we know, may be elicited by the administration to normals of a variety of compounds such as mescaline, lysergic acid diethylamide (LSD), atabrine (3), adrenochrome (4), CO₂, O₂ (5, 6, 7), thioglycollic acid (8), etc., or evoked by certain wave lengths of the stroboscope (9, 10); they can be produced also by a lesion in the temporal lobe of the brain (10) or by continuous lack of (mainly) perceptual stimuli (12), chemical (13) and surgical (14) sympathectomy, as well as through a variety of psychological or physiological stimuli (15) and stressors.

In an over-simplified and generalized way, let me propose the following tentative definition: model psychosis is characterized by symptoms of withdrawal from reality, frequently accompanied by perceptual disturbances, thought-disorders, delusional ideas and sometimes by hallucinations.

Let us recall in this context that there is a *phylogenetic* aspect of schizophrenia.

T. G. Byrne (16) has noted that a choice of three reactions is available to most organisms in response to external stress: an "avoidance", a "still or static" or an "approach" reaction. It is evident that the schizophrenic prefers the first or second of these possibilities, whereas a normal person may choose whichever response appears to him to be most appropriate to the occasion. A "still" reaction has a wide biological usefulness; at the lowest physiological level the still reaction is manifested by feigning death, at an intermediate level by muscular tension, and at a higher psychological level by immobility of emotional expression.

The schizophrenic process is the result of the inability of genetically predisposed people to bear experience.

The *schizophrenic's* "avoidance" as well as "still or static" state can then be compared with the corresponding withdrawal, thought disorder and the

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other symptoms characteristic of a *model psychosis* and it can be assumed that both syndromes contain regressive components from a phylogenetic point of view.

The phylogenetic aspect of mescaline intoxication for instance is emphasized already by Ivanow-Smolenski (17) according to whom the Pavlovian inhibition phase, evoked by mescaline, affects first the most recently acquired artificial conditioned reflexes (C.R.), second the natural C.R.-s, third the unconditioned reflexes thus affecting the subcortical functions. Evidently the inhibition retraces the path of evolution from the youngest to the oldest forms of nervous activity.

The phylogenetic aspect of schizophrenia, on the other hand, was stressed in a research paper where I defined it as a *regressive adaptation syndrome* (18) since certain stages of the General Adaptation Syndrome of Selye seem to be present permanently during certain phases of the schizophrenic process.

Apart from many similarities (1, 19, 20), there are of course differences between the schizophrenic process and a model psychosis, one of them being the chronicity of the former.

However, we should bear in mind that the use of our model is based on a hypothesis, and that, as Goethe remarks in his *Maxims and Reflections*: "Hypotheses are the scaffolds which are erected in front of a building and removed when the building is completed."

There is a group of psychiatrists whose members argue, as does Riebeling (47), that "the mescaline delirium is not a model of schizophrenia".

We could answer to this objection by restating that:

1. Model psychoses contain certain aspects of the acute phase of the schizophrenic process.

2. Can we yet agree on the definition, diagnosis and aetiology of schizophrenia so as to be able to state *ex cathedra* the appropriateness of any model?

3. Anybody criticizing the concept of model psychosis as hypothetical, dogmatic, evanescent or even unscientific should be asked about his psychological reasons for doing so; why did no one venture to criticize the benzene ring for not being a photographic representation of the "true" situation? Scientists are content that a molecular model (e.g. a benzene ring) should represent certain aspects of the compound in question.

4. Synthetic (LSD, etc.) and natural triggering agents utilize a common circuit which converge on the same centres. It is therefore irrelevant whether an impulse is due to a chemical (metabolic) change or has been produced by "artificial" stimulation: the changes will be reflected in the final electrical signs involved.

5. We do not know how compounds with well-established chemical configuration such as LSD or mescaline produce some of those symptoms also present in certain acute phases of the schizophrenic process. Let us find out more about this mechanism instead of reaffirming religiously a dogmatic belief that the model psychoses have no relation to schizophrenia.

A. LIVER FUNCTION IN SCHIZOPHRENIA AND IN MESCALINE-INDUCED MODEL PSYCHOSIS

Among the biochemical similarities let me emphasize the presence of a pathologically low hippuric acid excretion after the administration of sodium benzoate in certain acute schizophrenics on the one hand (20) and in healthy mescalinated (0.5 g. mescaline-hydrochloride s.c.) subjects (21) on the other.

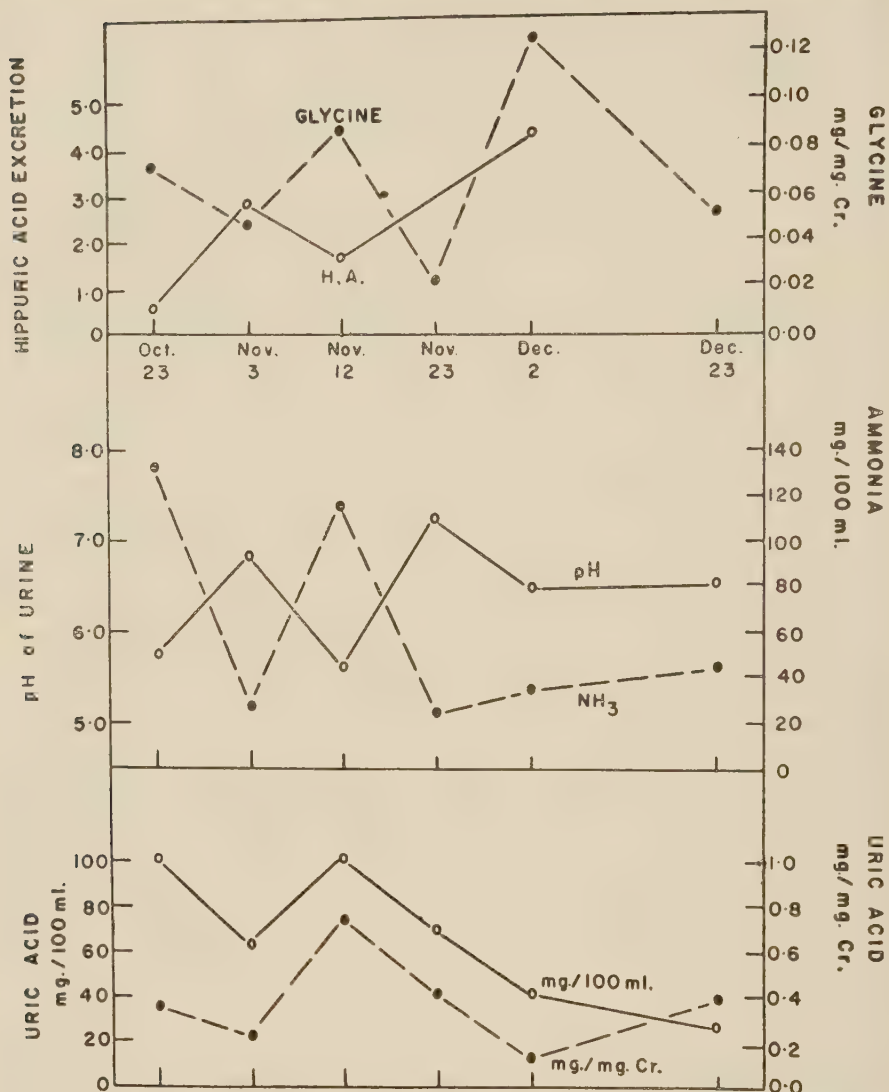


FIG. 1.—Inverse relationship between urinary “free” glycine and subsequent hippuric-acid excretion in a young catatonic schizophrenic male. (23 October—admission to hospital; 23 December—remission.)

It may be recalled that Quastel and Wales (22, 23) were the first to show that in catatonic forms of schizophrenia hippuric acid excretion is lowered after administration of sodium benzoate. We (20) have confirmed these results and extended them to other schizophrenic conditions. Various explanations were later suggested for this “faulty detoxication” in schizophrenia (24, 25, 26). It appears that those investigators who did not confirm the above findings did not use schizophrenic patients prior to treatment or did not supervise appropriately the water intake (52) and the diet of the patients; e.g. oats, prunes, etc., are known to increase hippuric acid excretion (20).

Our present knowledge indicates that the formation of hippuric-acid requires the conjugation of glycine and benzoate in the presence of adenosine triphosphate, magnesium ions, and coenzyme A (27, 28, 29). In some acute

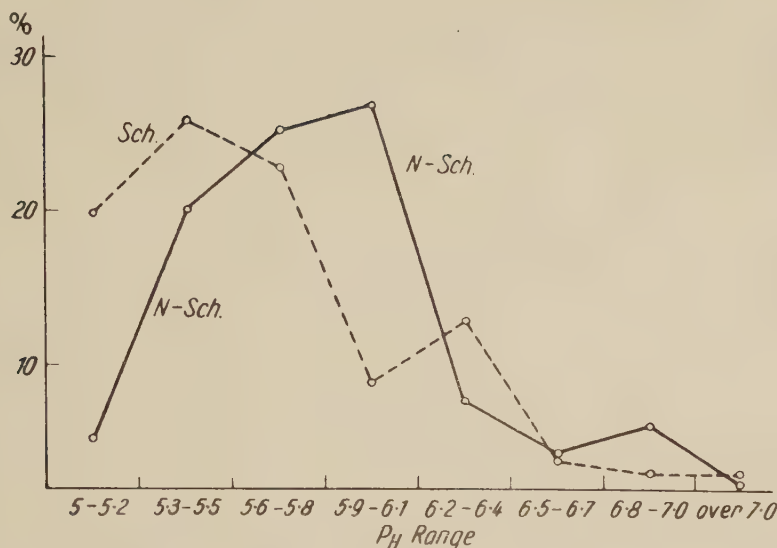


FIG. 2.—Frequency distribution of the pH-ranges of the urines of 130 schizophrenics (Sch.) and 114 non-schizophrenics (N.-Sch.); from Fischer, R.: *Naturwissenschaften*, **42**, 301 (1955).

schizophrenics we have found *high* amounts of glycine in the early morning urine (e.g. 90 μ g. per mg. creatinine, as measured by quantitative paper chromatography). These patients had a *low* hippuric acid excretion (approximately 2 g.) during the four hours after the oral administration of 6 g. of sodium benzoate; the amount of glycine in this urine was substantially diminished compared with the glycine in the early morning specimen.

Partial starvation, high protein catabolism (24), decreased thyroid function (30, 31, 32) which is believed to be connected with the regulation of the coenzyme-A level (28) and decreased basal metabolic-rate (24) are among the factors involved in this inverse relationship.

The aforementioned decreased basal metabolic rate and the resulting respiratory acidosis might also be a factor responsible for the significantly higher acidity of schizophrenic urine if compared with a normal and neurotic control population.

Repeated administration of sodium benzoate or surplus of glycine raises significantly the excretion of hippuric acid in certain schizophrenics, but only slightly in normal people (33).

The urine glycine of normal people we found to be higher during the night (40–80 μ g. per mg. creatinine) than in the morning (30–50 μ g. per mg. creatinine). These values were also inversely related to the hippuric-acid values in normal persons after ingestion of sodium benzoate which we had found earlier to be about 10 per cent. lower during the night than in the morning (20).

As to the possible underlying mechanism of the observed data, I should like to present the scheme shown in Fig. 4 overleaf.

Since repeated administration of sodium benzoate or the simultaneous administration of sodium benzoate with a surplus of glycine raises the amount of excreted hippuric acid, it is possible that the surplus of substrate raised the concentration of its enzyme. If this is true, it is likely that decreased conjugation (utilization) of glycine prevails during those phases of the schizophrenic process which are characterized by a low hippuric acid test (35).

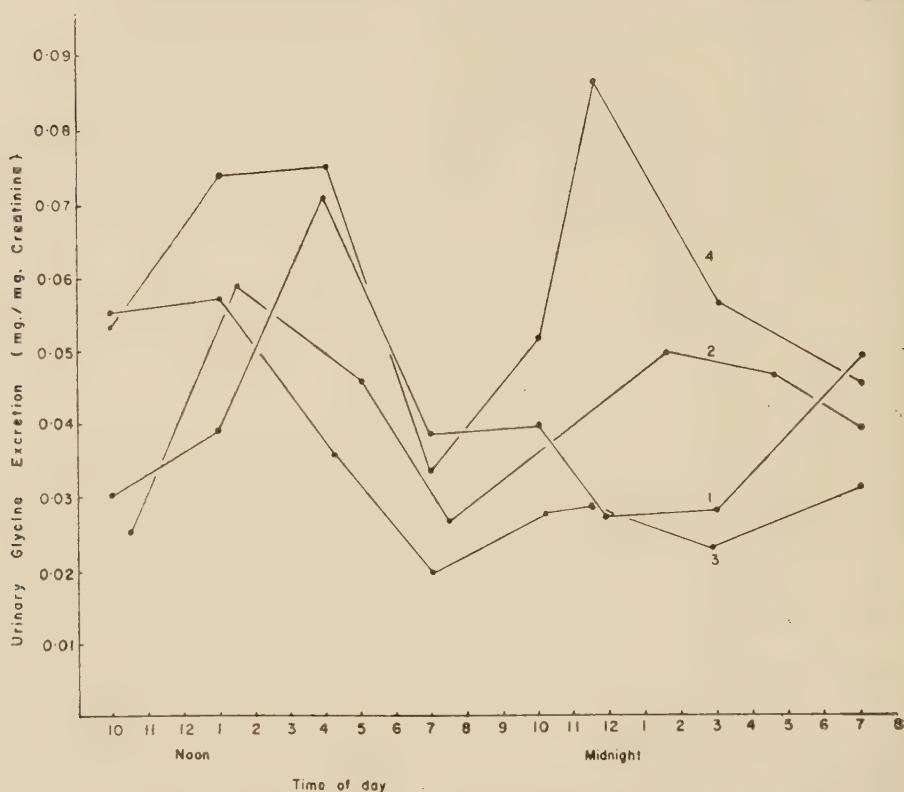


FIG. 3.—Diurnal rhythm of urinary "free" glycine excretion of 4 healthy individuals.

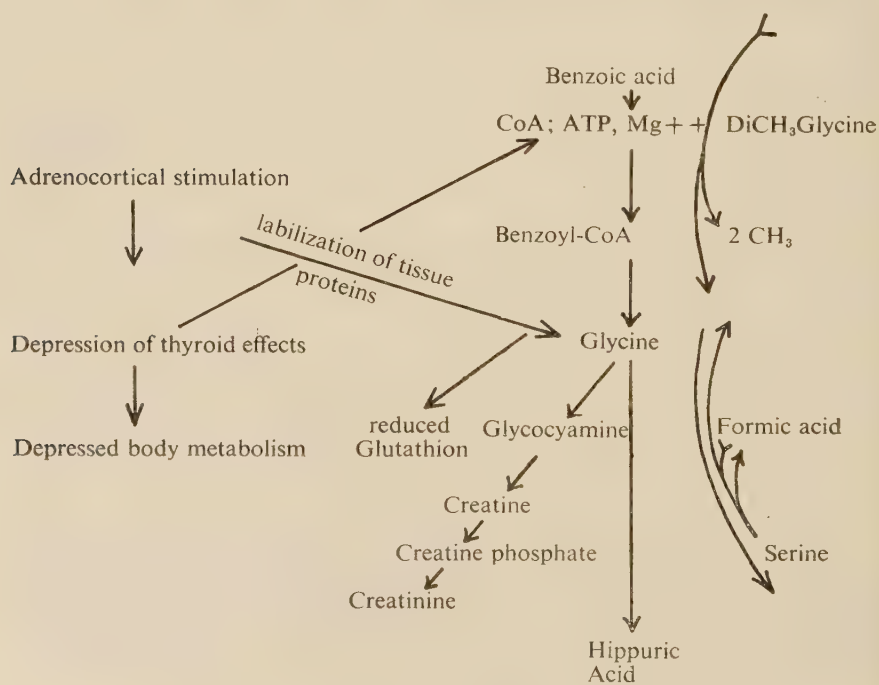


FIG. 4.—Partial scheme of glycine metabolism.

It appears therefore that the impaired hippuric-acid synthesis in certain acute schizophrenics might be due to a diminished pyrophosphorylation of CoA by ATP, a step preceding the exchange of the pyrophosphoryl-group for benzoyl- to form benzoyl-CoA which in turn is able to drive the reaction between benzoate and glycine forming hippuric acid.

B. STUDIES USING WOOL AS AN ENZYME-MODEL

In the course of our search for an *in vitro* model of the structural surface of receptors possibly involved in the production of an experimental psychosis, we turned to the use of wool protein (36).

The affinity for wool (37) of the following compounds was determined at pH 5.2: mescaline hydrochloride, methedrine (pervitine) hydrochloride, lysergic acid monoethylamide (LAE) and lysergic acid diethylamide (LSD), the latter two in form of their methanoltartrates. Those drugs, if administered to humans in the approximate range of dosage: 500 mg., 100 mg., 1 mg. and 100 μ g. respectively, cause an experimental psychosis characterized by hallucinations and related phenomena of similar intensity and duration.

The results indicate that there is a correlation between the affinity of a drug for wool and the ability of the same drug to produce hallucinations.

TABLE			
	Affinity, i.e. average millimoles $\times 10^{-2}$ of drug sorbed by 1 g. of wool	Single dose of drug in g.	log. of single dose

Mescaline	0	0.5	-0.3
Methedrine	0.6	0.1	-1.0
LAE	1.1	0.001	-3.0
LSD	2.6	0.0001	-4.0

Continuing these studies it seemed interesting to find out whether LSD has the highest affinity for wool if compared with some of its other biologically active and structurally related derivatives. We determined therefore the affinity for wool of the uterotonics D-lysergic acid 1-propanol-amide-(2) /ergobasine/ and D-lysergic acid (+) butanolamide-(2) /methyletergobasine/ compounds with no hallucinogenic activity and found that their affinity for wool was about $1.3 \text{ mM} \times 10^{-2}/\text{g.}$; this is half that of LSD.

Hence it can be stated that LSD, the activity of which in humans is displayed by such small amounts as $\approx 100 \mu\text{g.}$, has the highest affinity for wool protein whereas its monoethyl-, propyl- and butyl-derivatives have lower affinity for wool.

In the following, we will consider only mescaline, LAE and LSD. It can be argued that mescaline in itself is not the active compound when administered to human volunteers but forms compounds similar to the LSD or LAE structure. A recent hypothesis (38) postulates that this biosynthesis may be brought about, among others, through condensation of minute amounts of mescaline with nor-adrenalin or 5-hydroxytryptamine both recently identified in the brain (39).

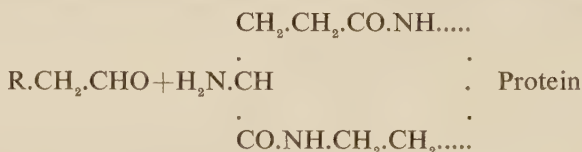
Another possibility is to consider the formation of an aldehyde from mescaline as an intermediate in a chain of events leading to an hypothetical active compound *in vivo*.

Block (40) has shown that only 0.03 per cent. of the C^{14} labelled mescaline is incorporated in the mouse-liver-protein 4-6 hours after the administration of the drug; in man this would amount to about 90-180 $\mu\text{g.}$ mescaline-protein

after administration of 300–600 mg. of mescaline. The order of magnitude of 100 μ g. LSD is similar to that of 90–180 μ g. mescaline-protein.

The affinity for wool of mescaline and its corresponding 3,4,5-trimethoxy-phenyl-ethyl-aldehyde* was determined and it was found that under the experimental conditions prevailing† the affinity of the aldehyde is twice as great (around $4\frac{1}{2}$ mM $\times 10^{-2}$ /g. of wool) as that of mescaline (2 mM $\times 10^{-2}$ /g. of wool).

Block (41) believes that the following reaction might take place in the liver:



with subsequent formation of a Schiff's base; the latter hydrolysed would yield the aldehyde again which can be easily oxidized to the corresponding acid; the original amine is also produced by such a split giving rise to mescaline which obtained its NH_2 -group from the protein. The amount of aminoxidase, necessary to initiate the reaction, is too small to be detected by present-day methods (41). It appears also of some importance to consider another aspect, namely the reversible and competitive inhibition of liver-aldehyde oxidase by epinephrine and its irreversible non-competitive inhibition by adrenergic blocking agents (42).

The situation is quite complex and though it does not simplify matters it should be remarked that Randall (43) has shown that 3,4,5-trimethoxy-phenyl-ethyl-aldehyde does not display any interesting pharmacological properties.

Let us come back again to the earlier-mentioned relation between the affinity of a drug for wool and the ability of the same drug to produce hallucinations. We found that methylene blue, N(2-diethyl-amino-n-propyl)-phenothiazine (Parsitan), 3-chloro-10-(3-dimethylaminopropyl)-phenothiazine (Chlorpromazine, Largactil) and β -diethylaminoethyl-N-phenothiazine (Diparcol) display a gradually increasing affinity for wool (3.3, 4.8, 5.3, 5.5 mM $\times 10^{-2}$ /g. wool respectively).

If, therefore, wool protein is a model of the neuro-receptors involved in the drug-induced experimental psychoses, then we might expect that those compounds displaying the highest affinity for wool will modify the LSD-caused psychosis, among others, perhaps by competitive inhibition. Experiments with Largactil (Chlorpromazine) suggest that a gradual increase in affinity for wool of a compound might be one of the factors associated with a more complete inhibition of the experimental psychosis (44).

A curvilinear relation was found to exist between the gradually increasing affinity for wool protein of the seven compounds (from mescaline to Diparcol) and the log. of their relative toxicity (0, 1.26, 2.54, 2.9, 3.35, 3.43, 3.43) towards 14-day-old tadpoles of *Xenopus levis*.

Such a relation seems to indicate that apparently similar type of receptors may be involved in the production and inhibition of experimental psychoses. The different levels of affinity for wool of certain compounds might imply that many compounds with high affinity display biological properties generally

* Kindly supplied by Prof. J. Pepper, Department of Chemistry, University of Saskatchewan.

† Since the aldehyde is not very soluble in water, the experiments were performed in dissolving 0.2 gm. of each of the substances in a mixture of 30 c.c. ethylalcohol and 20 c.c. of water and determining the affinity for 1 gm. of wool at 85° C. for 10 minutes.

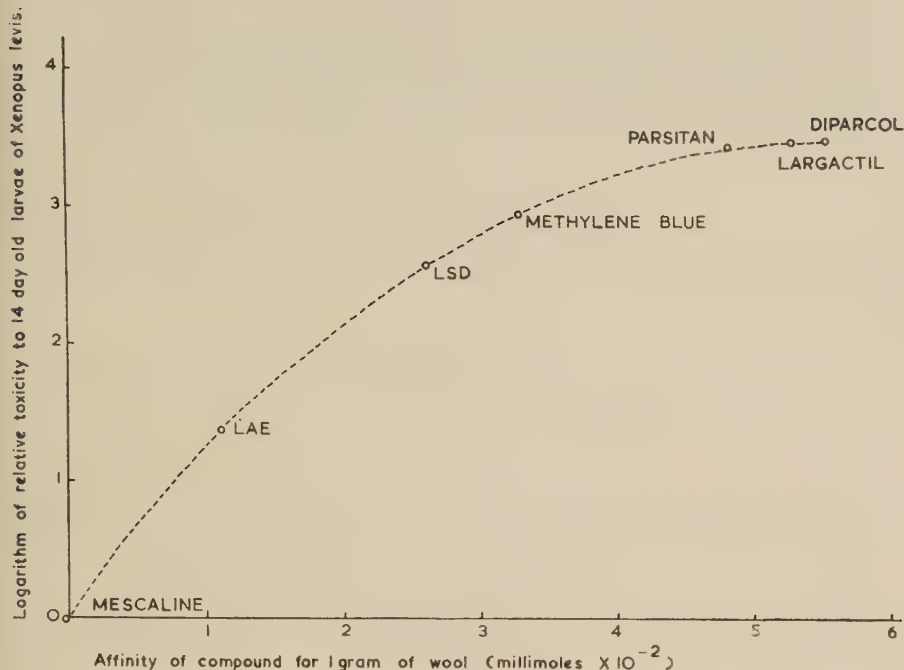


FIG. 5.—Relation between the affinity for wool protein of the seven compounds and the log. of their relative toxicity towards 14-day-old tadpoles of *Xenopus levis*.

including also those associated with compounds of low affinity for wool. The implication may be drawn that there is a hierarchy in terms of biological activity which is associated with the degree of affinity for wool. In general, those compounds of a homologous series which show high affinity have also a wider range of biological activity than those with low affinity for wool. This would be in agreement with the observation that there are many substances each of which acts on more than one enzyme. Ergotamine, for example, inhibits monoaminooxidase, diaminooxidase and cholinesterase (46).

Let me insert here a quotation from Zupancic (45): "The overlapping sensitivity of a few enzymes toward the same substance would be analogous to the retinal cone pigments with their overlapping but quantitatively different, absorption of the same monochromatic light."

Thema con variazioni

It could be, of course, that the "fifth method of delusion of the devil" actually works "by a disturbance of the humours". We mean the possibility that, for example, 150 γ and more LSD might produce a neurohumoral disbalance containing the symptoms of anxiety (24), or in other words certain symptoms of either Cannon's emergency or Selye's G.A.S. shock-phase. Once anxiety has been aroused and is sustained many perceptual thresholds are affected.

Any stimulation then which would affect the same circuit system, could alter the intensity of the model psychosis in either direction.

It is easier to understand in the light of the above hypothesis that a reassuring, familiar environment shortens the LSD-experience as well as diminishes its intensity, whereas stressful stimulations intensify the same experience (48).

"Tolerance to LSD develops more rapidly, is greater in degree, and is lost more rapidly than is tolerance to any other drug with which we are familiar" (49, 50, 51). It does not sound unreasonable to interpret the above observation by assuming that LSD-volunteers develop as well as lose tolerance faster to their own "disbalanced" neurohumours than to body-foreign drugs.

SUMMARY

The concept of model psychosis is discussed. An attempt is made to focus on certain biochemical deviations occurring during both the model psychosis and in schizophrenia. Some of the possible mechanisms involved in the production and modification of model psychosis are described.

ACKNOWLEDGMENT

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THE USE OF PACATAL IN LOW-GRADE MENTAL DEFECTIVES

By

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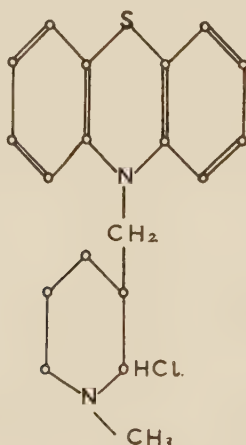
DURING recent years various tranquillizing drugs have been used therapeutically, namely, chlorpromazine hydrochloride (Largactil), reserpine (Serpasil), benactyzine hydrochloride (Suavitol) and hydroxyzine (Atarax) in mental disorders. Chlorpromazine and reserpine, though effective to a certain extent in mental disorders of the disturbed type, have the disadvantage of certain side-effects which have necessitated reduction and even cessation of the drugs, even when proving clinically efficacious.

Recently a drug has been produced, "Pacatal" (Mepazine), for which it is claimed that it has few troublesome side-effects while exerting an adequate effect on emotionally and mentally disturbed patients.

The purpose of this experiment was to test the value of "Pacatal" on a group of 30 mental defective patients showing gross disorders of conduct which were evident clinically in disturbed and difficult behaviour.

CHEMISTRY

Pacatal is a synthetic compound, N-methyl-piperidyl-(3)-methyl phenothiazine (generic name, Mepazine). It is available as the hydrochloride for oral use and the acetate for injection, both of which are photosensitive.



PHARMACOLOGY

Tolerance studies demonstrate the safety of Pacatal in human administration (Nieschulz *et al.*, 1954) and there were no adverse effects on the haemopoietic system, growth or weight, or histologically in tissues removed at autopsy from experimental animals, except when a dose equivalent to 20 times the suggested therapeutic dose for humans was administered to the animals (100 mg. per K daily for 6 months).

The absorption and excretion of Pacatal has been studied by Hinriksen *et al.* (1956); the drug is rapidly absorbed when administered orally, and more so when injected intramuscularly or intravenously. The major part of the substance is destroyed in the body, and only a small amount is recovered in the urine. The maximum urinary concentration is within 24 hours, excretion is complete in 4 days, suggesting no serious cumulative tendencies.

The work of Neischulz *et al.* in 1954 on the pharmacology of Pacatal has been confirmed by others (Kopf, Warner-Chilcott Research Laboratories) and has shown that Pacatal inhibits and stabilizes the central and peripheral regulating mechanism of the autonomic nervous system and directly depresses the central nervous system. The more important effects are:

- (a) Sedation and tranquillization, and potentiation of other sedative and hypnotic drugs.
- (b) Potentiation of analgesics.
- (c) Equal influence on the sympathetic and parasympathetic nervous systems. Its hypotensive effect is weak.
- (d) Moderate antipyretic properties.
- (e) Weak anticonvulsant effect.
- (f) Specific effect on cardiac arrhythmias.

SIDE EFFECTS

The side-effects of Pacatal which are described are dryness of the mouth and difficulty in visual accommodation especially with high dosages. No skin rashes, jaundice, Parkinsonism or orthostatic collapse have been recorded.

METHOD

A group of 30 mental defectives was chosen, all of whom showed the following symptoms, which made them a major nursing problem. These symptoms were used as criteria for assessment of any change in their condition while the drug trial was being conducted.

Hyperkineses	Incontinence
Destructiveness	Dirty feeding habits
Noisiness	Aggression and violence
Temper tantrums	

Fourteen of the 30 patients suffered from epilepsy of major and minor types. The I.Q. of 27 patients was below 30 (Terman Merrill), 3 being between 30 and 40. Their ages ranged from 8-41 years, the average age being 19.366 years.

For children of 12 or below the following dosage of Pacatal was given:

- 12.6 mg. t.i.d. for 3 days
- 25 mg. t.i.d. for 3 days, and then
- 50 mg. b.d. for 1 week, and thereafter
- 50 mg. t.i.d. for 15 days.

For patients over 12 years, the following dosage was given:

- 25 mg. t.i.d. for 3 days
- 50 mg. t.i.d. for 3 days
- 100 mg. b.d. for 1 week, and thereafter
- 100 mg. t.i.d. for 15 days.

The experiment was conducted on the "blind" method, two types of tablets "A" and "B" being given, one Pacatal and the other a placebo, the identity of which was unknown to the assessor of the drug trial.

During the first two weeks of the trial, all previous sedation was stopped, except in the case of those patients who required anticonvulsants, which were continued unchanged throughout the experiment. During the next 4 weeks one group of 30 patients received tablets "A" and the other group of 30 were given tablets "B" in the above dosage. This was followed by a period of 2 weeks "rest" when the patients again received no sedation. During the following 4 weeks, those who had previously received tablets "A" were given tablets "B" and similarly those who had previously had tablets "B" were given tablets "A". This was again followed by 2 weeks' "rest". In a few cases, their behaviour during the rest period became extremely disturbed, and an occasional dose of paraldehyde became necessary.

Assessment of the patients' condition was made at weekly intervals when the patient was interviewed and comments by the nursing staff were recorded. Daily notes were made by the nursing staff about the patients' behaviour, and they were seen frequently in the wards in the intervals between the weekly assessments. Morning and evening temperature charts were kept throughout the periods when patients were taking tablets "A" and "B". Close observation for signs of intolerance was kept (dryness of the mouth, disturbance of visual accommodation).

RESULTS

During the first week there was very little change in any of the patients, the higher dosage of the drug not having been reached. However, in the following weeks some of the patients showed a transient drowsiness which diminished even though the drug was not reduced.

Those who did improve were less distractable, and were able to take more interest in occupational therapy or in the television, having showed no such previous tendencies. Some exhibited an improvement in their previous incontinence, and a few were less destructive, and less noisy and interfering. These improvements continued while on Pacatal, and gradually disappeared after the cessation of the drug, so that the patient returned to his usual behaviour pattern within the next 2 weeks.

Side effects were observed in a number of cases, the most prominent was dryness of the mouth. This occurred in 8 cases during the second, third and fourth weeks of administration. No disturbance of visual accommodation was noticed, but then none of these patients was able to read, and few were able to feed themselves. Pyrexia of a mild degree occurred in 6 cases, the majority during the third week, and this, unlike the dryness of the mouth, subsided even though Pacatal was continued. Anorexia was present in 6 cases, 2 occurring during the second and third weeks, but one of these cases commenced symptoms of anorexia and vomiting during the first and second weeks *after* stopping Pacatal. The symptoms gradually subsided and no clinical signs were present. Three cases seemed "afraid to walk" during the third week, but no unsteadiness was elicited, they merely seemed to prefer to cling on to support when made to walk. This subsided when Pacatal was discontinued. Drowsiness was present in 3 cases, beginning in the third week and decreasing even though Pacatal was continued.

It was noticed that those patients who suffered from epilepsy showed a higher tendency to improvement than the non-epileptic cases.

One patient was a juvenile psychotic (schizophrenic) and he showed moderate improvement, with diminution of the reaction of excitement to hallucinations.

A summary of the results from the record sheets of the patients listing the various aspects of their disturbance is set out in the table below:

			Total No.	%	Epileptics No.	Total No. = 14 %
<i>Treated with Pacatal:</i>						
Slight worsening	..	..	3	10	3	21.47
No change	..	..	18	60	3	21.47
Slight improvement	..	..	8	26.66	7	50
Moderate improvement	..	..	0	0	0	0
Marked improvement	..	..	1	3.33	1	7.11
<i>Treated with Placebo:</i>						
Moderate worsening	..	..	1	3.33	1	7.11
Slight worsening	..	..	3	10	1	7.11
No change	..	..	25	83.33	11	78.59
Slight improvement	..	..	1	3.33	1	7.11
Moderate improvement	..	..	0	0	0	0
Marked improvement	..	..	0	0	0	0

DISCUSSION

From the results obtained from this trial, it can be seen that the majority of cases on Pacatal showed no change (60 per cent.) and 22.66 per cent. were slightly improved. In the group of 30 cases, 14 were epileptics, and of these cases 50 per cent. showed slight improvement in behaviour, the frequency of the fits being in no way influenced. The explanation of this improvement in the epileptics might be the potentiation by Pacatal of the sedative effect of the anti-convulsants.

Only one case in the group was a juvenile psychotic, and showed only slight improvement while taking Pacatal.

It is of interest that 4 patients developed anorexia and vomiting during the first and second weeks after the drug was withdrawn, and since no clinical symptoms of other illness were present, this suggests that Pacatal may not be as rapidly excreted as claimed and that a certain degree of cumulation does occur.

SUMMARY

Pacatal was administered to a group of 30 low-grade mental defectives, and the results proved the drug to be of limited value, except in the case of epileptics where the sedative effect of anti-convulsants was potentiated.

ACKNOWLEDGMENTS

I wish to thank Dr. J. V. Morris for his advice and encouragement, and W. R. Warner & Co. Ltd. for their co-operation in supplying the Pacatal and placebo tablets. I am grateful for the help given by the nursing staff at Little Plumstead Hospital.

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SOME EFFECTS OF METHYL-PHENIDATE (RITALIN) AND AMPHETAMINE ON NORMAL AND LEUCOTOMIZED MONKEYS

By

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INTRODUCTION

IN a previous report (Cole and Glees, 1956) on methyl-phenidate (Ritalin) as an antagonist to reserpine (Serpasil) in monkeys we referred to a similar effect produced by amphetamine. Following up this work we have now studied and compared the effects of methyl-phenidate and amphetamine when given separately without reserpine to normal and leucotomized monkeys.

Leucotomized animals were used for two reasons: first, in order to study the reaction of a brain-damaged monkey to these drugs, and secondly to investigate whether the interruption of pallido-diencephalic and fronto-diencephalic connections would aid in the location of these drugs' "target area" in the central nervous system.

MATERIAL AND METHODS

Fourteen monkeys were used in the experiment, four *Macaca nemestrina* and ten *Macaca mulatta* varying in weight between 2.5 kg. and 4 kg.

For this particular experiment the *M. mulatta* proved more suitable than the *M. nemestrina* as the latter shows less spontaneous activity, and it was this activity which we proposed to use as a measure of the effects of the drugs.

All the monkeys were observed before and after the administration of the drugs, and the activity of seven was measured in a specially designed cage; of these seven, three had had a bilateral leucotomy eight, ten and thirty-six weeks respectively before testing.

The testing cage, through which passed a beam of infra-red light focussed on an electric photo-cell, enabled us to record the day and night movements of the monkey. These were registered on a counter and at the same time marked on recording paper so that we not only obtained the number of movements in any given period, but also their distribution. In this way the animal's normal activity and the changes produced by the drugs were plotted. This method was particularly useful in obtaining data on the monkey's sleeping habits, which we found to be a very sensitive indicator of the effect of the drug.

The electrical apparatus we used was designed and constructed by Dr. R. H. Kay of this laboratory to whom our sincere thanks are due.

When in the recording cage, the monkey was kept in a room by itself in order to avoid social stimulation by other monkeys, and was observed by one of us (J.C.) from the next room through a panel of one-way vision glass.

The counter and movement recorder were also in the observer's room so that readings could be taken at will without disturbing the monkey.

All monkeys were allowed at least a week in the recording cage in which to adjust to the environment. During this time they were carefully observed and an experiment was not begun until their pattern of daily activity had settled down to a constant level.

DOSAGE USED

One of the chief problems encountered in designing our experiment was to decide what were equivalent doses of the two drugs used. In this matter we were advised by the manufacturers of methyl-phenidate, who suggested that amphetamine was approximately twice as potent as methyl-phenidate. We therefore used the one to two ratio and experience has tended to confirm its validity, but it is possible that a ratio of two to five may be even more accurate.

We used single doses of 10 mg. of methyl-phenidate or 5 mg. of amphetamine, given by subcutaneous injection at 10 a.m.; this enabled us to observe their effect on normal daytime behaviour. In no case was either drug administered with less than three days' interval between doses.

METHOD OF LEUCOTOMY

The three *M. mulatta* monkeys operated on were anaesthetized with nembutal and a small opening cut on each side of the skull either with a trephine or dental drill. The openings were made in all cases with their posterior edge bordering on the coronal suture. After the pia had been incised with an iridec-tomy knife, bilateral lesions were made laterally, medially and down to the orbital plate of the base of the skull with scissors and a spatula (Fig. 1). The

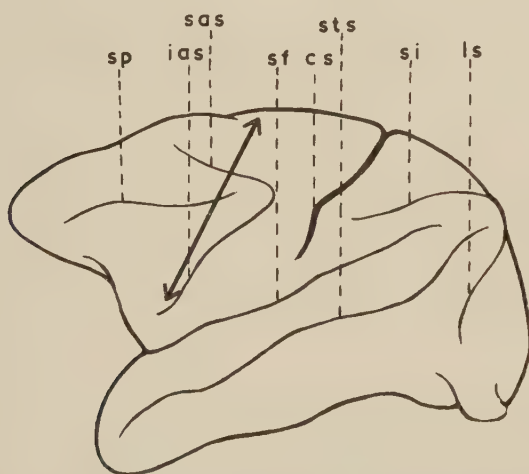


FIG. 1.—Lateral view of the left hemisphere of a *Macaca mulatta*. The arrow drawn in an oblique transverse plane on the frontal lobe illustrates the level of leucotomy carried out in M.S.10.

Abbreviations for sulci are as follows:

c.s.	=	central sulcus
i.a.s.	=	inferior ramus of arcuate sulcus
l.s.	=	lunate sulcus
s.a.s.	=	superior ramus of arcuate sulcus
s.i.	=	sulcus intraparietalis
s.t.s.	=	sulcus temporalis superior
s.f.	=	Sylvian fissure
s.p.	=	sulcus principalis

dura was closed, but not sutured, the bone replaced, the area dusted with penicillin, and the subcutaneous fascia and scalp sewn with multiple sutures.

Two of the monkeys showed typical post-leucotomy confusion and some "tameness"; all within a few days developed marked hyperactivity during the daytime which, up to the time of writing, has persisted in one animal for fourteen months. No monkey showed any evidence of paralysis after operation, and with the exception of the aspiration of some fluid from under the scalp in one case convalescence was normal and uneventful.

RESULTS

Our findings can most easily be given under the headings of the drugs' effects on the daytime activity and the sleep pattern of the monkeys, considering in each case first the intact animals and then those that had been leucotomized.

EFFECT OF DRUGS ON DAYTIME ACTIVITY

1. UNOPERATED MONKEYS

(a) *Methyl-phenidate*

The first visible effect of the drug was an increase in cage pacing, then within three to six minutes of the injection multiple small tic-like movements of the hands and feet, of the scalp, ears and eyes, and especially of the lips and mouth were seen. There was also frequent touching of the naso-labial region, "smelling" and sucking of the fingers, chewing movements and biting of the cage bars. This activity of the mouth, nose and lips was a most striking and consistent phenomenon. With the increase of the tic-like movements cage-pacing decreased and the monkey sat or stood in one corner of the cage or clung to its side. Responses to external stimuli such as noise were exaggerated and fear reactions intensified. The animals also scratched themselves far more than normally and frequently picked over their hair as if looking for lice.

When the effect of the drug was wearing off, the small movements gradually ceased, those of the lips and mouth lasting longest, and then for a period of from two to three hours gross locomotory movements around the cage showed an increase, thus repeating in reverse the phenomena seen during the onset of the drug's effect. Throughout the six- to eight-hour period during which the drug was producing its maximum effect, the monkey's tail appeared to be more rigid, and in the case of *M. mulatta* was often held horizontal as the animal walked around. During the twenty-four hours measured from one hour before the giving of the drug its total movements showed an increase over normal.

(b) *Amphetamine*

All the effects produced by methyl-phenidate appeared after the injection of amphetamine, but to a greater degree. For instance, locomotion showed first an increase then a greater decrease, the period during which the drug's effect was most pronounced was prolonged and the "rebound" increase of activity continued far longer than after methyl-phenidate. The monkey also had a greater tendency to climb as high up its cage as possible and remain there in the position assumed by the normal monkey when alarmed. The total locomotory movements during twenty-four hours were usually in excess of those recorded for the same period after methyl-phenidate, as we reported in an earlier paper (Cole and Glees, 1956), and their distribution differed in the way we have mentioned.

2. LEUCOTOMIZED MONKEYS

(a) *Methyl-phenidate*

All the effects seen in the unoperated monkeys were produced when methyl-phenidate was given to those that had had a leucotomy, and although the period after operation varied from eight to thirty-six weeks, this made no difference to the results. All the operated animals showed the tic-like movements during the period of the drug's maximum effect, the temporary fall in cage pacing was greater than in the intact animals, but over the twenty-four hours, as in the case of the intact monkeys, the total number of movements recorded showed an increase.

(b) *Amphetamine*

The various signs observed during the daytime in the intact monkeys were all seen in the leucotomized animals which were given amphetamine.

There was, however, one striking difference.

Whereas in the intact monkeys after amphetamine the total of the recorded movements during the twenty-four hours showed an increase, in those that had been leucotomized it showed a decrease.

EFFECT ON SLEEP PATTERN

The fact that in every case the monkeys were given their injection at 10 a.m. is important when considering the effects of the drugs on the sleep pattern, because it means that the periods of multiple small movements and of the rebound increase in activity had both occurred and passed before the animals' usual time for sleep.

The normal monkey settles to sleep at sunset; during the night it makes few movements, but becomes fully active within half an hour of sunrise. This pattern is seen both before and after leucotomy (Figs. 2(a) and (d), 3(a) and (d)).

1. UNOPERATED MONKEYS

(a) *Methyl-phenidate*

After methyl-phenidate the monkey settles for the night at sunset as usual and thereafter few, if any, movements are recorded until sunrise (Fig. 2(b)).

In the morning the activity pattern follows a normal course, i.e. transition from sleep to full activity is extremely rapid (Fig. 3(b)).

(b) *Amphetamine*

After amphetamine the result was different. All the monkeys remained restless and active after sunset—for three hours in one case; throughout the night short bursts of activity were recorded and early morning activity occurred before sunrise (Figs. 2(c) and 3(c)). This disturbance of the sleep pattern after amphetamine was in sharp contrast to the normal undisturbed night after methyl-phenidate, and is the most striking and consistent difference between the effects of the two drugs which we have recorded.

2. LEUCOTOMIZED MONKEYS

(a) *Methyl-phenidate*

The sleep pattern of the leucotomized monkeys given methyl-phenidate was—as in the case of the unoperated animals—normal. The animal settled

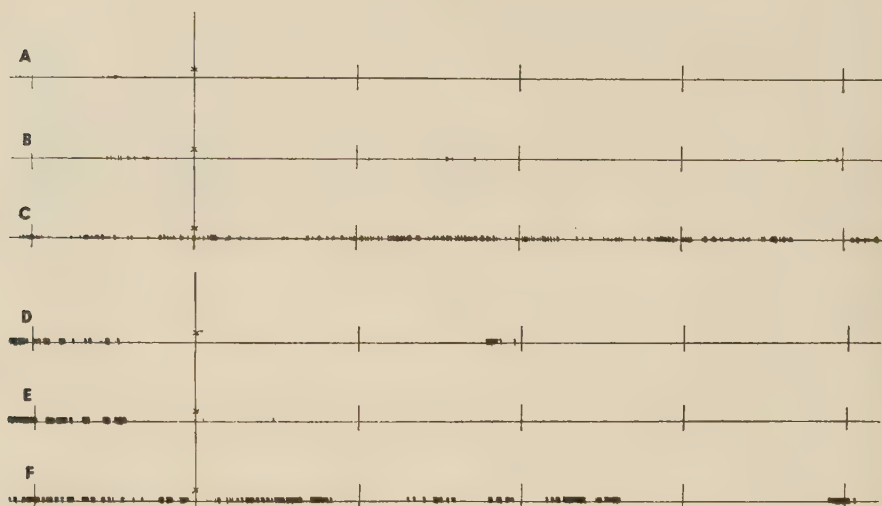


FIG. 2.—Vertical lines indicate 30 min. periods; the line marked with X gives the time of sunset.

Records A, B, C are from an intact monkey.

Records D, E, F are from a monkey three months after bilateral leucotomy.

A and D are without drugs.

B and E are after 10 mg. of phenidylate given at 10.00 hours.

C and F are after 5 mg. of amphetamine given at 10.00 hours.

Note the restlessness continued well into the normal sleeping period after amphetamine, and the normality of the sleep pattern in the phenidylate records.

The small burst of activity one hour after sunset in record D was caused by the accidental disturbance of the monkey.

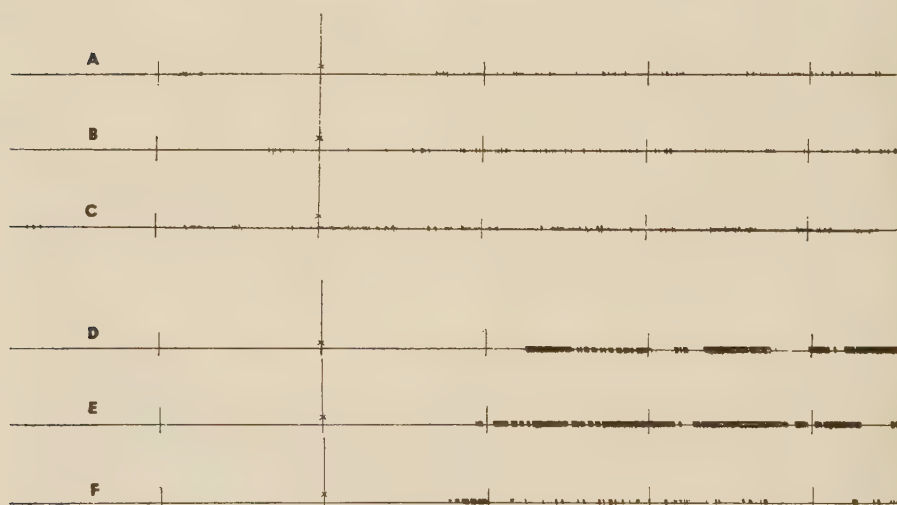


FIG. 3.—Vertical lines indicate 30 min. periods; the line marked with X gives the time of sunrise.

Records A, B, C are from the same intact monkey as in Fig. 2.

Records D, E, F are from the same operated monkey as in Fig. 2.

A and D are without drugs.

B and E are the morning after 10 mg. of phenidylate given at 10.00 hours.

C and F are the morning after 5 mg. of amphetamine given at 10.00 hours.

Note the early restlessness in records C and F and particularly the intermittent and decreased activity after sunrise in F compared with D and E.

at dusk, very few movements were recorded during the night, and with sunrise activity followed a normal pattern (Figs. 2(e) and 3(e)).

(b) *Amphetamine*

Amphetamine given to leucotomized monkeys affected their sleep pattern for, like the intact animals, they continued active long after sunset (Fig. 2(f)) But in contrast to the intact animals, once they had settled, their night remained undisturbed. In the morning their activity began at the usual time, but was much less and far more intermittent than normal (Fig. 3(f)). This effect of amphetamine on the early morning activity pattern in the leucotomized monkeys differs both from their own early morning records after methyl-phenidate (Fig. 3(e)) and also from those of the intact monkeys after amphetamine (Fig. 3(c)).

The ability of the leucotomized monkeys to remain asleep during the night, combined with the decrease in their early morning cage pacing accounts for their less than normal activity over a twenty-four hour period after amphetamine. As stated in a previous paragraph this decrease during the twenty-four hours in which amphetamine is given, is one of the most significant ways in which the reactions of the leucotomized and intact monkeys differ.

In order to eliminate the possibility that the different effects, and particularly the change in sleep pattern seen after amphetamine were due merely to a quantitative difference in the dose, we gave a double amount, i.e. 20 mg. of methyl-phenidate to two leucotomized and to two intact monkeys. This failed to produce, in all four monkeys, the long delay in settling to sleep; in the intact animals the restless night and in the leucotomized monkeys the decrease in spontaneous activity in the morning which were such typical effects of amphetamine (Figs. 2 and 3).

With regard to the daytime activity in the leucotomized monkeys, a temporary but very considerable increase in cage pacing occurred over that recorded after 10 mg. of methyl-phenidate and in sharp contrast to the fall seen after amphetamine. The intact animal on the other hand did show a drop in activity more nearly corresponding to that produced by amphetamine, but at the same time less evidence of agitation and tension. Furthermore, the effects produced by the drugs were not observed after the subcutaneous injection of similar amounts of saline.

DISCUSSION

Our findings that both methyl-phenidate and amphetamine decrease the spontaneous daytime cage pacing of monkeys, at least for some hours, needs to be considered alongside the report of Meier, Gross and Tripod (1954) that both these drugs produce a fourfold increase in the activity of mice. At first sight their results appear to conflict with ours. By the courtesy of Dr. Gross one of us (J.C.) examined the type of "jiggle cage" used in their experiments and found that it registered in the mouse many of the small fidgeting movements of the kind observed in our monkeys, and that it did not distinguish between the locomotory movements of the mouse as it ran round the cage and restless movements made in a very limited area; in fact it summed all movements of both types.

In contrast, our cage gave us no record of the multiple small movements, but distinguished between these and locomotion by selecting and recording only the latter. This explains the apparent contrast of our findings with those of Meier, Gross and Tripod.

Turning to the consideration of the drugs' effect on the monkeys' sleep pattern, particularly that of the leucotomized animals, we would relate this to observations made on the use of methyl-phenidate in psychiatry. Ferguson (1955) studying the stimulating effect of methyl-phenidate in patients depressed by reserpine, uses their sleep pattern as a criterion of mental tension and writes: "the further from the normal towards insomnia or other sleepless patterns, the more tense the patient" (p. 106).

Although terms such as "mental tension" must be used with caution when applied to animals, it is, nevertheless, helpful to avail ourselves of this concept to explain the way in which the reaction of the leucotomized monkey to amphetamine differed from that of the unoperated animal. The operated monkeys given amphetamine, though late in settling to sleep, showed records of undisturbed nights, but the intact animals after the same dose remained restless throughout the night. We suggest, therefore, that leucotomy by cutting the fronto-diencephalic circuit prevents the storage of afferent impulses to the frontal lobe and the consequent building-up of a "state of tension".

From this it would follow that in the intact animal given amphetamine the disturbed sleep pattern indicates a state of tension which is impossible after leucotomy. For the operated monkey once it is deprived of external stimuli and especially of light is able to remain asleep because the amphetamine without the self-sustaining nervous circuit from the frontal areas to act upon cannot produce nor maintain the state of tension, which manifests itself in nocturnal restlessness. This is also probably valid for man, since Partridge (1950) notes that his leucotomy patients experienced deep and dreamless sleep.

NEUROHISTOLOGICAL AND FUNCTIONAL ASPECTS OF LEUCOTOMY

Leucotomy, as previously stated, was used in our experiment in order to estimate the effect of the drugs on the activity of brain damaged monkeys. In their study of leucotomy, Freudenberg *et al.* (1950) found that this operation produces in the monkey long lasting restlessness and perambulation. A state of hyperactivity was also seen by Glees *et al.* (1950) after lesions in the cingular gyrus, which involved adjacent parts of the frontal lobe. But this restlessness began immediately after operation in contrast to the hyperactivity following leucotomy which begins after about ten days. The increase of cage pacing by the leucotomized animal depends on "triggering" by outside stimuli and ceases when these are excluded. This was clearly established by the improved method of continuously recording movements which was used in this study. Cage pacing is also more marked the further posterior the lesion is made.

In Freudenberg *et al.* (1950) neurohistological observations revealed that the prefrontal cortex of the monkey has a strong afferent connection with the dorso-medial nucleus of the thalamus, and Glees, Meyer and Meyer (1946) showed that fibres from this nucleus reach the frontal cortex. Leucotomy therefore interrupts a circuit which passes to the thalamus and from there back again to the frontal cortex.

In addition to interrupting these pathways it also involves the basal ganglia, in particular the globus pallidus (Fig. 4) and causes degeneration of the pallido-hypothalamic tract. This fibre bundle connects the globus pallidus with the ventro-medial nucleus of the hypothalamus. Its course and termination have been studied experimentally in the monkey and discussed by Glees (1945).

The interruption of these pathways (Fig. 5), the fronto-thalamic, the thalamic-frontal and the pallido-hypothalamic appears to be a causal factor in producing increased perambulation.

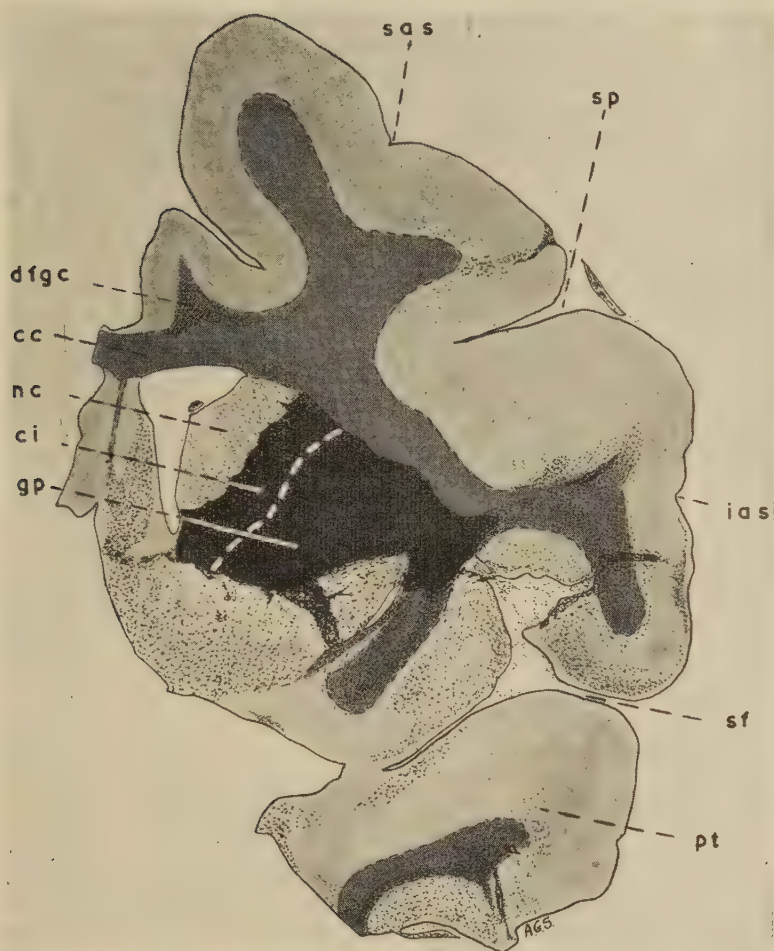


FIG. 4.—Section through the plane of leucotomy in the right hemisphere of M.S.10 stained with the Marchi-technique. The area drawn in black shows the area of necrosis and involves the anterior limb of the internal capsule and the lentiform nucleus (putamen and globus pallidus). The dotted areas show fibre degeneration and also cell changes.

Abbreviations:

c.c.	=	corpus callosum
c.i.	=	capsula interna
d.f.g.c.	=	degenerated fibres in white matter of gyrus cinguli
g.p.	=	globus pallidus
i.a.s.	=	inferior ramus of arcuate sulcus
n.c.	=	nucleus caudatus
p.t.	=	temporal pole
s.a.s.	=	superior ramus of arcuate sulcus
s.f.	=	Sylvian fissure
s.p.	=	sulcus principalis

Fulton (1948) discussing the function of the orbital gyri which are also involved in our lesions, holds the opinion that injury to this region is responsible for the increase in spontaneous activity. Wall *et al.* (1951), in studying the fibre connections of this orbital area, demonstrated the termination of fibres, mainly from area 13, within the ventro-medial and paraventricular nuclei of

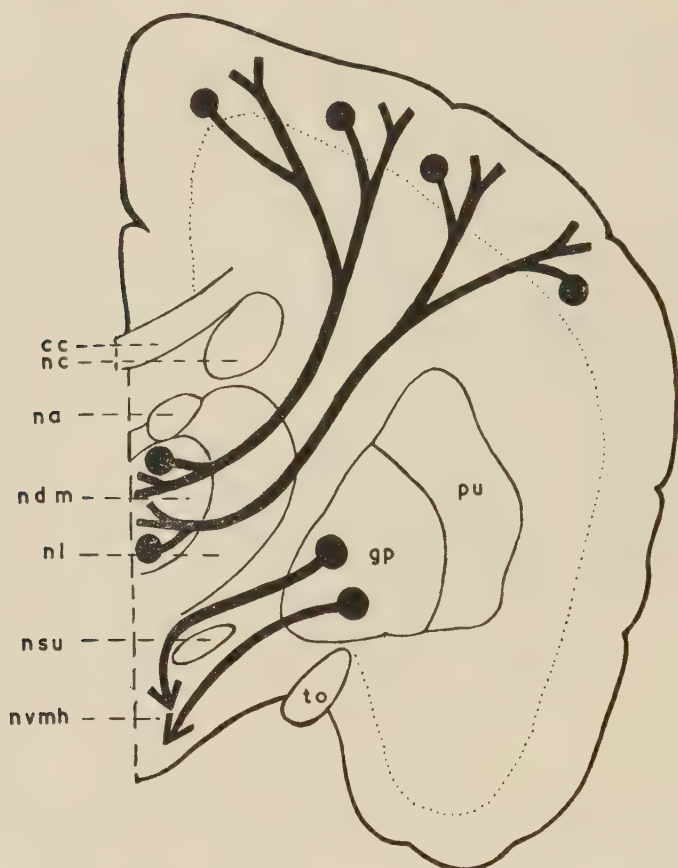


FIG. 5.—A diagrammatic representation of the fronto-thalamic and thalamic-frontal connections of the globus pallidus with the hypothalamus. The connections referred to in the text between orbital lobe and hypothalamus (Wall *et al.*, 1951) run in a horizontal plane and are not shown.

Abbreviations:

c.c.	=	corpus callosum
n.a.	=	nucleus anterior
n.c.	=	nucleus caudatus
n.d.m.	=	nucleus dorsalis medialis thalamii
n.l.	=	nucleus lateralis
n.su.	=	nucleus subthalamicus
n.v.m.h.	=	nucleus ventro-medialis hypothalamii
g.p.	=	globus pallidus
pu.	=	putamen
t.o.	=	tractus opticus

the hypothalamus. This is the same region which receives fibres from the globus pallidus. We suggest, therefore, that the daytime restlessness in our leucotomized monkeys is essentially due to the removal of a damping influence from the orbital regions of the frontal lobe and from the globus pallidus. In attempting to discover the target area or areas for amphetamine and methyl-phenidate it is highly significant that both drugs change drastically the motor pattern by almost stopping perambulation and bringing about the much finer tic-like movements.

EFFECTS OF LEUCOTOMY, AMPHETAMINE AND METHYL-PHENIDATE
ON THE HYPOTHALAMUS

We stated in a previous paper (Cole and Glees, 1956) that the increase in parasympathetic-like activity seen after large doses of reserpine could be reversed by methyl-phenidate or amphetamine, and suggested that these two drugs increased the sympathetic outflow. One of the sympathetic centres in the hypothalamus is the ventro-medial nucleus referred to above which therefore might well be a "target area" for methyl-phenidate and amphetamine. Further evidence for the activation of the sympathetic nuclei in the hypothalamus by these drugs is the marked restlessness and alertness which they cause in the unoperated monkey. The reason for this statement is the well-established fact that lesions in the sympathetic centres of the hypothalamus (posterior hypothalamus) produce among other symptoms the opposite effect, namely, complete abolition of spontaneous movements (Collins, 1955). The catatonic-like effect of such lesions closely resembles that seen after an injection of a large dose of reserpine (Cole and Glees, 1956). A similar state of catatonia and stupor was also found by Feldberg and Sherwood (1955) after intraventricular injection of bulbo-capnine or anticholinesterases.

We believe that the two drugs under consideration reverse the reserpine syndrome by greatly increasing sympathetic activity. Moreover, in the leucotomized monkey these drugs, acting on a nervous system which has already lost the inhibiting influence of the frontal lobes and the globus pallidus, produce more marked effects than in the normal animal. For while the motor system in the leucotomized monkey reacts to the absence of the inhibiting influence of the damaged areas by excessive daytime perambulation, when the drugs are given the increased sympathetic activity overwhelms the orderly movements and produces the generalized tics. Therefore it is because of the presence of the intact inhibiting cortical and subcortical systems in the unoperated monkey that the effects of the drugs are less marked and of shorter duration in these animals than in those that have been leucotomized.

The significance of hypothalamic functions for neuropsychiatry—and our work is relevant to this field—has been repeatedly stressed and recently been summarized by Gellhorn (1956) and by Feldberg (1956). We, too, for the reasons stated, hold the view that the hypothalamus is the most likely "target area" for centrally stimulating or depressing drugs. The important data on the reticular system gathered by Magoun, French and their co-workers have also to be considered in the interpretation of our results. In this connection their interesting finding that the frontal cortex influences the activity of the ascending reticular system (French *et al.*, 1955) deserves special attention. For some of the effects of leucotomy could be produced by the interruption of the fronto-reticular system which they describe. The hypothalamus, however, is a link in the chain of the reticular system and is an integrated part of that portion of the reticular system which exercises an "alerting" influence on the cortical E.E.G. so that our hypothesis is not at variance with their results.

GENERAL COMMENT

A point of some significance, both for our experiment and for wider issues, and one which became increasingly definite as our work proceeded, is that there appears to be no such thing as a standard monkey, for directly these animals are studied in detail, important individual differences appear.

Thus, while it is true that monkeys settle to sleep about sunset and during

the night make few movements, but become fully active around sunrise, nevertheless individual animals have a characteristic and consistent sleep pattern, which, while conforming to the general pattern in outline, differs from it in minor details. For instance, one unoperated monkey always had two small bursts of activity during the night, another consistently showed a period of movement about an hour before sunrise. For this reason we made a careful and detailed study of each individual monkey's pattern of activity throughout the twenty-four hours before we attempted to test the effects of the drugs.

The same individuality was also apparent in the animals' reactions to the drugs; there was always an overall similarity of reaction, but this when analysed in detail revealed consistent individual traits.

While in all monkeys methyl-phenidate and amphetamine caused a decrease in activity, then a period of rebound activity, we found on comparing and analysing several records of monkeys No. 5 and No. 9, that No. 9 responded to both drugs by a shorter period of decreased activity and a much greater rebound period than did No. 5.

We would stress this point of the individual differences appearing within a general conformity to a broad pattern, because the findings reported in this paper are mainly concerned with the broad pattern of reaction to the drugs used. Moreover, we would expect to find in the clinical use of these drugs similar individual variations of responses in human patients to those we have observed in our monkeys.

Furthermore, we are of the opinion that studies of the effect of drugs on primates can give valuable indications for their use in clinical psychiatry. Closer co-operation between those engaged in experimental studies of drugs and clinicians would therefore be advantageous in the field of psychiatric research, by facilitating the advance of our knowledge and avoiding some of the divergences of opinion as to the clinical value of a particular drug to which Shepherd (1956) draws attention.

SUMMARY

1. Fourteen monkeys were given on different days 10 mg. of methyl-phenidate (Ritalin) and 5 mg. of amphetamine.
2. The day and night activity of eight was recorded by means of a special cage. Of these eight, three had had a bilateral leucotomy and five were intact.
3. Both drugs caused a decrease in daytime locomotion, but a marked increase in small tic-like movements and fidgeting. The effect of amphetamine was the more marked and prolonged.
4. Methyl-phenidate in contrast to amphetamine had no effect on the sleep pattern of any of the monkeys.
5. A double dose (20 mg.) of methyl-phenidate given to two intact and two leucotomized monkeys failed in both cases to produce the same effects as amphetamine.
6. Histological studies of the brains of the leucotomized monkeys showed that pathways from the frontal lobe to the dorso-medial nucleus of the thalamus and in the reverse direction had been interrupted in addition to pathways from the orbital area of the frontal lobe and the globus pallidus to the posterior hypothalamus.
7. The increase in locomotion after leucotomy is probably due to the interruption of these pathways, particularly those to the hypothalamus.
8. The effect of the drugs on both the intact and operated monkeys would indicate the posterior hypothalamus as a possible "target area".
9. It is suggested that testing the effects of drugs on primate behaviour can supply information useful in psychiatry.

ACKNOWLEDGMENTS

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Review

From Custodial to Therapeutic Patient Care in Mental Hospitals. By MILTON GREENBLATT, M.D., RICHARD H. YORK, Ph.D., and ESTHER L. BROWN, Ph.D. Russel Sage Foundation, New York, 1955. Pp. 497+vii. Price \$5.

This book describes a planned effort to improve the lives of patients in three mental hospitals. The Boston Psychopathic, a teaching hospital for acute cases only, receives most attention. Bedford Veterans and Metropolitan State have large chronic populations. The approach is entirely social; clinical aspects are occasionally referred to, but not discussed. Ample scope for reforming zeal was offered by a rigid administration which took no account of medical requirements; by repressive and restrictive measures, supposedly designed to protect the patient and society, but sometimes used punitively; by a ward of sixty-five patients, two-thirds of whom "rarely left the colorless, materially empty day rooms, halls and dormitories except to go to meals or wander through connecting wards . . . These men shifted for themselves. There was no regularly assigned attendant, nurse or employee of any kind. They never knew who was going to wake them in the morning, or to whom to bring requests with any assurance of serious consideration . . . The time from breakfast to dinner and dinner to supper, and supper until bed was a succession of periods of 'just sitting' or 'dozing'".

During the project there was an improvement in living conditions, amenities, clothes and food. Seclusion, restraint and sedation were reduced or abolished. Occupation and recreation were planned for and fostered. Classification was more careful and available facilities adapted more to the patients' varying needs. Greater responsibility was given to nurses and their initiative encouraged by easy social intercourse and informal discussion groups. A relaxation of social distinctions increased communication between doctors, nurses and others and created a sense of social unity and purpose. The process of changing "disturbed" and "deteriorated" wards, selected for special attention, is described in detail.

All who have embarked upon any part of such a programme will know its exigencies. Confident enthusiasm is an indispensable requirement in meeting them, and much in this book testifies to its wholesome effect. In the chapter on "Treatment Results", however, a more exacting attitude would have been valuable. A five-year follow-up study of 100 consecutive admissions shows that, following their discharge, less than 50 per cent. remained out of hospital for the whole of that period. Sometimes, too, the authors seem inclined to throw out the baby with the bath water. They quote with approval Dr. Banen who concluded that there are no reliable indications for predicting suicide in psychotics but emphasized "the universality of the suicide potential in any patient". Does this mean that in taking precautions against suicide no distinctions between patients are to be made?

As would be expected, much attention is given to securing the most effective effort from nurses. To a striking degree, informal methods are preferred to systematic instruction and training. In their recommendations the authors say "it is important that the hospital make provision for continuous in-service training . . . Psychodrama, seminars and discussion groups, the ward staff meetings . . . supervision of a counselling nature and group therapy sessions are amongst the useful techniques for helping members of the staff gain deeper insight". Again, "Provision of opportunity for the staff frequently to play together as a psychologically validated medium for lowering status barriers, reducing myopic misconceptions and misunderstandings and developing a spirit of camaraderie". Considering that all but a small proportion of the nursing staff were untrained aides and attendants, it is possible that this approach was the best immediate course open to the authors, but it is doubtful if, in the long run, it can sustain the effort required to produce the high standards of nursing care, already seen in a few hospitals today, without a solid foundation of systematic training.

The bibliography lists 665 classified titles and there is an excellent index.

DAVID C. WATT.

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The Significance of Liver Function in the Formation of Fibrinogen in Multiple Sclerosis

On the basis of pathological-anatomical and experimental investigations Putnam has advanced the theory that in multiple sclerosis thrombi were formed in the small veins of the central nervous system, through which formation of the characteristic plaques was supposed to occur. Later investigations have shown, however, that it is maybe not a matter of coagulation thrombi; but it is possible that the blood platelets alone can agglutinate, thus blocking the vessels and causing infarction.

In connection with multiple sclerosis factors have been demonstrated which may be considered likely to facilitate the thrombus formation, so that, among other things, the plasma fibrinogen is raised. As fibrinogen is made in the liver, examination of the functions of the liver seemed to be of value in this disease.

The investigations described in this article concerning several functions of the liver, however, did not point towards any serious liver damage. Thus nothing argued against the raised plasma fibrinogen content in multiple sclerosis being due to an increased formation in the liver. However, the raised fibrinogen content can hardly be considered the actual cause of the formation of thrombi which maybe produce plaques, as, among other things, a rise in the fibrinogen content which is not accompanied by the formation of thrombi in the central nervous system may occur in other chronic diseases. Hence it follows that as far as increased fibrinogen formation is concerned the liver cannot be supposed to be of any specific importance for the pathogenesis in multiple sclerosis.

(Author's Abstr.)

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Brain Changes in Electroshock Therapy

1. The brains of 4 patients who died following electroshock treatment were studied.
2. A massive intraventricular hemorrhage was found in one. The other 3 had petechial hemorrhages, particularly in the periaqueductal gray matter and brainstem.
3. Only 1 case could be considered a cerebral death, the other 3 dying of cardiac failure.
4. The literature on animal experiments and reports on human beings are reviewed and discussed.
5. If the individual being treated is well physically, most of the neuropathological changes are reversible. If, on the other hand, the patient has cardiac, vascular, or renal disease, the cerebral changes, chiefly vascular, may be permanent.

(Author's Abstr.)

The Effect of Mescaline on Differentiated Conditional Reflexes

Mescaline produced an inhibitory state accompanied by a schizokenesis or dissociation of systems. This disharmony was also manifested in that the CS appeared to act in the same manner as the US. On this basis a neurodynamic theory of the mechanism of mescaline's actions is postulated: that under mescaline intoxication and in some mental illnesses, a dissociation of the second and first signaling systems and the unconditional reflexes occurs in which each signaling system acts as if it were the same as the more primitive system on which it is based. The secondary signals—words and ideas—come to act like the primary signals of sensations and direct impressions of reality. This theory may help explain certain psychological phenomena, e.g. dreams, hysteria, compulsions, delusions and hallucinations. While the content of these phenomena depends on the personality of the subject and all the environmental factors that determine this personality, their mechanisms are physiological, regardless of whether one prefers a pathophysiological or psychogenic etiology. Based on our experimental findings and the work of others, a neurodynamic pathogenesis of the psychological effects of mescaline is described.

(Authors' Abstr.)

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On Going Berserk: A Neurochemical Inquiry

The ingestion of hallucinogenic mushrooms by Siberian tribes of the Kamchatka peninsula and by Indians of the Mexican highlands has been carried out in ritual and orgy for centuries. Ødman and Schübeler have advanced the hypothesis that the furious rage of the Berserks in the heyday of Viking culture a thousand years ago was brought about by the same agency, specifically the *Amanita muscaria* mushroom. A few years ago it was found that these fungi contain bufotenine, or n-n-dimethyl serotonin, a substance which is under scrutiny at this time for its possible neurochemical role in the causation of schizophrenia. Recent observations on the intravenous injection of bufotenine in man disclose that it is an hallucinogen, and that its psychophysiological effects bear a resemblance to the Berserksgang of the Norsemen in the time of the Sagas. These observations appear to offer support to the Ødman-Schübeler contention that the famed fury of the Berserks was what we would call a model psychosis today.

(Author's Abstr.)

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Chlorpromazine and Reserpine

(A) Effects of Each and of Combinations of Each with Morphine.

(B) Failure of Each in Treatment of Abstinence from Morphine.

In non-tolerant former opiate addicts, chlorpromazine enhanced the miotic effects of morphine and prolonged some of the subjective effects. One milligram of reserpine given orally and concurrently with 30 mg. of morphine subcutaneously did not increase the effects of morphine.

In patients addicted to morphine, neither chlorpromazine nor reserpine administered orally or intramuscularly reduced the intensity of abstinence from morphine.

(Authors' Abstr.)

Reserpine in Hospitalized Psychotics

The data obtained may be summarized as follows:

1. No difference between the reserpine group and the placebo group appeared in the 28 chronically disturbed psychotic women until 8.0 mg. of reserpine was administered daily.
2. The placebo group did not differ from the group who were given no pills.
3. On the basis of an analysis of the scores on the individual items of a psychiatric rating scale, reserpine in adequate dosage was found to produce statistically significant improvement in socialization as compared with a placebo, but no other items showed improvement which was within the 0.05 level of confidence.
4. Great variation in amount and duration of improvement occurred, so that no patients were well enough to be discharged and all who had improved relapsed partially while receiving the same amount of reserpine, suggesting an escape from the medication effect.
5. Fifteen weeks after medication was discontinued, the mean rating scores of all three groups had returned to the base line level of abnormality.

(Authors' Abstr.)

Clinical Relationship of Enuresis to Sleepwalking and Epilepsy

In the course of a series of exploratory studies designed to provide further avenues for therapeutic and theoretic research into symptomatic immaturity habits, it becomes necessary to elaborate the clinical relationships of enuresis, somnambulism, epilepsy, and poor quality of dentition.

The findings after interview with 200 enuretics and 200 controls show that the enuretic has a statistically significantly greater family and past history of enuresis, sleepwalking, and epilepsy and a greater past history of epilepsy. The enuretic is more likely to have inferior dentition.

Theoretically, in some cases, epilepsy, enuresis, and somnambulism may represent different manifestations of a similar biophysical aberrancy. This abnormality may have been genetically determined and result in "seizures" as a consequence of pathophysiologic changes during sleep which are influenced by emotional duress. The research implications and diagnostic use of such a relationship are discussed.

(Authors' Abstr.)

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Cerebrospinal Fluid Thrombocyte-Agglutinating Substance in Multiple Sclerosis

In multiple sclerosis plaques seem to occur at certain sites of predilection, that is, around the small veins in the central nervous system and periventricularly. On the basis of Putnam's thrombus theory, 10 patients with multiple sclerosis were investigated to see whether in the cerebrospinal fluid changes could be demonstrated which might explain the localization of plaques. The result of the investigations was that in connection with the periods of progression the cerebrospinal fluid contains a thrombocyte-agglutinating substance. It could be considered a reasonable explanation of why plaques occur at special sites of predilection to presume that the cerebrospinal fluid in periods of progression contains a thrombocyte-agglutinating substance which penetrates into the small veins of the central nervous system. By this means the thrombi, which consist of masses of agglutinated platelets, would arise.

(Author's Abstr.)

Ability to Discover Hidden Figures After Cerebral Lesions

Sixty-four men with traumatic, penetrating brain wounds, and forty-three controls with peripheral-nerve injury were tested on a hidden-figure task. Although none of the brain-injured groups, differentiated on the basis of locus of lesion, differed one from the other, all brain-injured sub-groups were significantly inferior to controls. When the brain-injured population was subdivided according to presence or absence of neurologic defect, neither those with visual field defect, nor those with epilepsy, nor those with somatosensory defect were more impaired than brain-injured persons without such defects. The group with aphasia, however, performed significantly worse than the non-aphasic brain-injured group, which, in turn, was surpassed by the controls. These differences remained, even after statistical elimination of present differences in intelligence.

(Authors' Abstr.)

Behavioral Changes During Intracerebral Electrical Stimulation

This report deals primarily with the observed behavioral changes consequent to electrical stimulation of various sites within the substance and on the cortex of the frontotemporal region in a boy with psychomotor epilepsy. The implanted-electrode technique was utilized, so that observations were on the awake subject over the course of several days. The method of psychological observation was the interview, continuously recorded, and conducted by an independent observer while stimulations were applied. The psychological data were analyzed clinically and also in such a way as to allow statistical treatment and quantitative statements concerning the behavioral changes without contamination by preconceptions of the effects of stimulation. Stimulation of various areas evoked a range of manifest responses extending from direct sensory experiences (predominantly mouth sensations) to changes in complex behavior patterns. These latter were most uniquely reflected in verbalizations of feminine strivings. There was a tendency toward area differences in the type of responses which stimulation evoked. There was also an observed difference in the types of responses in different interview situations. The possible significance of these observations is briefly discussed. It is suggested that stimulation might alter the balance between drive and defence.

(Authors' Abstr.)

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Ultrasonically Produced Changes in the Blood-Brain Barrier

The effect of focused ultrasound on the blood-brain barrier was studied in cats. The animals were killed from 10 minutes to 5 days after irradiation, having received single intravenous injection of radioactive phosphate and trypan blue within 10 minutes to 3 hours before death.

Ultrasound-produced lesions stained selectively with trypan blue. They also revealed large P^{32} concentration as compared with the surrounding normal brain tissue. The variation of the P^{32} concentration of the lesions with time elapsed from the administration of the isotope directly follows the changes in plasma P^{32} concentration. Such a linear relationship does not exist between normal brain tissue and plasma. These observations point to a profound alteration of the blood-brain barrier permeability within the confines of lesions produced by ultrasound.

Small lesions show a uniform deposition of trypan blue and P^{32} . Large lesions frequently reveal an "island-and-moat" pattern, with greater tissue destruction and tracer deposition in the moat than in the central island.

Gray matter, whether cortical or nuclear, was found to be more resistant to ultrasound than white matter.

The mode of actions and usefulness of trypan blue and P^{32} as tracers are compared and discussed.

The microscopic picture of cerebral damage produced by ultrasound is presented with special regard to the significance of vital staining and to the morphological changes of neurons. (Authors' Abstr.)

Studies on Lysergic Acid Diethylamide (LSD-25)

In former opiate addicts, the diethylamide of lysergic acid induced anxiety, mood changes, feelings of unreality, visual perceptual distortion, optical hallucinations, depersonalization, and derealization. Concomitantly, resting blood pressure was elevated, pupils were dilated, and the tendon reflexes were accentuated. Characteristics of the LSD reaction appeared to be the same in former opiate addicts and in non-addicts.

The degree of both the "mental" and the "nonmental" changes increased with the dose of LSD. The intensity of the reaction induced by LSD remained the same when the same dose was repeated after an interval of a week or more.

When LSD was given daily, tolerance was evident after administration for only three days. After tolerance was well developed, administration of as much as four times the standard dose of LSD did not restore the original intensity of the reaction. On discontinuation of LSD, tolerance was lost as rapidly as it was developed.

(Authors' Abstr.)

Temporal Lobectomy With Removal of Uncus, Hippocampus, and Amygdala

A completely disabled patient with medically uncontrolled psychomotor seizures who shows a consistent unilateral electrical focus in the anterior temporal region has a 41 per cent. chance of being free from all seizures for five years after temporal lobectomy. There is a 78 per cent. chance of being free from psychomotor seizures, a 58 per cent. chance of being free from grand mal seizures only, a 66 per cent. chance of attaining freedom from disturbing psychiatric complaints, and an 86 per cent. chance of gaining economic independence. In summation, two of three patients will gain a successful operation when all practical factors have been totally evaluated. This compares favorably with results in many other neurosurgical procedures employed today. These deductions are based on the results in 36 patients who have been followed for an average of five years since one anterior temporal lobe was removed. It is essential that the removal include not only the temporal tip but also the uncus, the hippocampal gyrus, and the amygdaloid nucleus.

(Author's Abstr.)

Effects of Chlorpromazine on Chronic Lobotomized Schizophrenic Patients

Twenty male lobotomized schizophrenics, who had been hospitalized an average of 10 years, were divided into two groups matched for age, duration of hospitalization, years since

lobotomy, and psychiatric status (Malamud-Sands Rating Scale). One group was given placebos and the other chlorpromazine by mouth, on a double-blind basis. When the chlorpromazine dose was increased to 800 mg. daily, the scores on the rating scales for two groups were differentiated, the placebo group showing little or no change, whereas the chlorpromazine group showed a significant trend to betterment in their scores. An analysis of 15 items which were used in the rating scale showed that on 4—responsivity, socialization, perception (hallucinations), and thought processes—the improvement in the chlorpromazine group was statistically significant.

(Authors' Abstr.)

Adrenal Cortical Function in Anxious Human Subjects

Plasma hydrocortisone level and urinary hydroxycorticoid excretion was 60 per cent. and 70 per cent. greater, respectively, in anxious subjects on a "base day" than in normal controls. The elevated blood and urine levels were maintained in the anxious subjects over a four-day testing period. When a stress interview was administered to every anxious subject on each of the last three days, it failed to increase significantly either the blood or the urine hormone levels in the group as a whole. When the stress days were segregated into high, medium, and low days for each subject, the change in plasma hydrocortisone level was significantly greater on the day of greatest increase in anxiety. The elevated plasma and urine hormone levels in the anxious subjects are taken as evidence that the adrenal cortex is secreting at a higher rate than in normal controls.

(Authors' Abstr.)

Delirium With Low Serum Sodium

Reduction of sodium concentration in the blood is capable of causing delirium. This, in turn, is reversible by the administration of sodium.

Some of the mechanisms by which serum sodium is reduced are discussed, with particular attention to those encountered in major surgery and in the treatment of cardiac edema. A dangerous combination of sodium-depressing mechanisms is seen to occur when sodium-depleted cardiac patients undergo major surgery.

From a survey of 27 patients who had mitral commissurotomies, 3 cases of low sodium delirium are reported. Symptoms began only when the serum sodium reached 121 mEq/L or lower. However, clearing occurred only when the level returned to 130 mEq/L or higher.

That delirium may also occur without major surgery was apparent in a case in which stringent deprivation and diuresis of sodium were used in the treatment of cardiac edema.

Since delirium may be the only detectable sign of sodium depression, it is suggested that a serum sodium determination be done in any undiagnosed disturbance of consciousness occurring within the first week after major surgery. Levels below 130 mEq/L would direct treatment toward careful restoration of the sodium or to dehydration to increase its concentration. An abrupt favorable response to this may be considered a confirmatory diagnostic test, although complete clearing of delirium may not occur for days. Levels above 130 mEq/L would direct attention to other possible causes of the delirium.

(Author's Abstr.)

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The Entorhinal Area: Behavioral, Evoked Potential, and Histological Studies of Its Interrelationships With Brain-Stem Regions

1. The entorhinal area has been studied in the marsupial phalanger (*Thrichosurus vulpecula*). It has been removed by a procedure causing minimal damage to the hippocampus and amygdaloid complex.
2. Bilateral resection of the entorhinal area is followed by an immediate and sustained reduction in the phalanger's normally aggressive responses to handling or provocation by noxious stimulation. Unilateral removal of the area does not significantly modify the aggressive behaviour. Animals with a bilateral ablation also exhibit a profound curiosity not seen in the intact animal and are aroused particularly by moving objects. Although displaying considerable tameness after bilateral resection of the entorhinal area, the phalanger still appears capable of sustained and directed attention.
3. Evoked potential studies have been made in ablated and intact animals of the hippocampal and auditory responses to click and tone stimulation. No evidence of a tonotopic organization of the auditory cortex could be found in curarized animals, nor could occlusion ("blocking interaction") be detected between auditory and somatic responses in somatic area II.
4. Records from the hippocampus following bilateral removal of the entorhinal area continue to show both primary responses and slow-wave trains in response to auditory stimulation. Simultaneous records from the auditory cortex usually show trains of spindles at 8 to 10 per second following the primary response in the ablated animals. Such spindle-trains have been sought in unoperated animals but have been seen only rarely, and then only after exposing the animal to continuous stimulation for many hours. The relationship of these spindles to those seen in normal sleep and in mid-brain lesions is discussed.
5. Experimental histological studies of the efferent pathways from the entorhinal area by silver impregnation methods strongly suggest direct connections between the entorhinal area and the tegmental regions of the mid-brain. This pathway runs initially via the external capsule into the anterior commissure and is then distributed bilaterally through the stria medullaris, coursing posteriorly on the dorsal surface of the thalamus. The fibres terminate in the dorsal tegmentum of the mid-brain adjoining the periaqueductal grey matter.
6. The role of the hippocampus in the process of alerting is discussed in the light of these and other studies. It is suggested that the hippocampus may be connected with deep centres in the diencephalon and mid-brain (the so-called "reticular areas" of the brain stem) by two routes. The hippocampus is activated from the septum and intralaminar nuclei of the thalamus via the fornix bundles. It is suggested that the hippocampus may project via the entorhinal area to the mid-brain tegmentum by way of the stria medullaris, thus forming part of a re-entrant pathway into the reticular formation, which is itself powerfully concerned in sleep and wakefulness.

(Authors' Abstr.)

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The EEG in Cerebral Atrophy

EEG data on 25 cases with cerebral atrophy as shown by PEG have been presented and related to pneumoencephalographic and clinical findings. The results were compared with the findings of other workers reported in the literature. The following conclusions were drawn.

1. The EEG is more often than not abnormal in patients whose PEG's show cerebral atrophy. There is a rough relationship between presence of EEG abnormality and the degree of structural change. All kinds of EEG abnormalities are observed in such cases, with slow activity being the most common.
2. The EEG does not provide valid indication of the location or distribution of structural changes as revealed by the PEG.
3. There is a definite relationship between the presence of EEG abnormality and the occurrence of seizures. Seizure discharges, however, occur in only a minority of such cases.
4. There is no EEG feature pathognomonic of cerebral atrophy.
5. The PEG and the EEG are not necessarily indicators of the same pathological phenomena, but provide complementary information.

(Authors' Abstr.)

The Use of Chlorpromazine in Psychotherapy

1. Four patients in psychotherapy were carried for 10 weeks on gradually increasing doses of chlorpromazine (50 mg. to 400 mg. daily), at the end of which time the medication was suddenly discontinued. This was followed (or preceded) by 10 weeks on a chlorpromazine placebo (a double-blind experiment).

2. Careful notes were made of the psychodynamic changes which took place in each patient.

3. No effects which could be specifically attributed to the chlorpromazine were demonstrated during the gradual build-up and continued treatment with the drug. However, when it was suddenly discontinued, there was a dramatic change in each patient. These changes were reviewed and discussed.

4. The results of this investigation suggest that chlorpromazine is useful in psychotherapy when it reduces internal disturbance enough to allow good contact with the therapist. On the other hand, psychotherapy may be impeded by a dosage which is high enough to dull the affects and/or the motivation for treatment.

(Authors' Abstr.)

Some Observations on the Minimal Effective Dosage of Chlorpromazine

1. Thorazine is of indisputable value in aiding "social adaptation" in a hospital setting.
 2. No specific factors such as age, duration of illness, or diagnosis are apparent, in this series, that may be of use to foretell the expected response to the drug.
 3. An impression has been gained that further investigation of premorbid personality and the autonomic nervous system may help in producing such a correlation.
 4. The indications for therapy of this kind are symptomatic and behavioral and not diagnostic.
 5. The use of E.C.T., especially "maintenance" treatment, can be diminished.
 6. The effective dosage is much lower than most of the published reports would indicate.
 7. Those patients who will react favorably do so in a short time and with small doses.
 8. The response depends upon factors which are, as yet, immeasurable.
 9. The responses obtained have been shown to be directly attributable to Thorazine.
 10. No advantage of the intramuscular route when compared with the oral route could be found. Intramuscular injection facilitates the administration of the drug in certain patients.
- (Authors' Abstr.)

APRIL

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Prefrontal Procaine Injection: A Study of Fourteen Patients with One Year Follow-up

The procedure of injecting a 1 per cent. procaine solution into the prefrontal portion of the brain was utilized in fourteen psychiatric cases with an immediate result of much improvement in two, slight improvement in four, and one death.

At the end of a follow-up period of at least a year, during which other somatic therapies were also used, two patients were found to have recovered, four patients to be much improved. These much improved patients were not able to participate in an "uncovering" type of psychotherapy.

Prefrontal procaine injections have been found to affect the course of, and to have a limited therapeutic usefulness in, psychiatric disorders.

(Authors' Abstr.)

The Possibility of Psychosomatic Involvement of the Central Nervous System in Schizophrenia

Two areas of the cerebral cortex are considered very important in mediating the symptomatology of schizophrenia. The first area includes a large part of the temporal lobe and small parts of the parietal and occipital lobes. The second area includes the prefrontal lobes. It is demonstrated how in schizophrenia there is a gradual impairment or decrease in the functions of these areas and a return of primitive mechanisms. A third area, which consists of the archipallium, is also considered very important in the symptomatology of schizophrenia, but only secondarily involved.

The described cortical impairment is considered psychogenic, aiming at a return to levels of organization where overwhelming anxiety, derived from high forms of symbolism, cannot be experienced. The process is thus seen as a teleologic regression which, however, fails inasmuch as it brings about nervous mechanisms which complicate rather than simplify the dysequilibrium.

(Author's Abstr.)

Investigations on the Glyoxylic Acid Reactions on Urines from Schizophrenics and Other Psychotic Patients

1. The glyoxylic acid test with urines of psychotic patients gave positive reactions with the majority of the 65 schizophrenics, negative reactions with the majority of the 67 non-schizophrenics, including 12 normal adults.

2. The factors responsible for the test reactions are briefly discussed and related to the presence in the urine of a substance with an indole nucleus, other than indole, possibly tryptophan or its metabolites.

(Author's Abstr.)

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The Incidence, Composition, and Pathological Significance of Intracerebral Vascular Deposits in the Basal Ganglia

Present knowledge of these vascular deposits in the basal ganglia is still in the recording stage. Although it is probably premature to speculate too intensively on their significance, a few conclusions do emerge from this study.

Granular, deeply basophilic, perivascular deposits are found in the basal ganglia in 68.5 per cent. of routine autopsy cases. They consist of an acid mucopolysaccharide ground substance containing iron, but only rarely calcium. Although it is fairly safe to label the organic material of the deposits as acid mucopolysaccharide, this does not solve much of the problem. Acid mucopolysaccharide substances are often seen with so-called "changes" in the ground substance of connective tissue. Since there is no connective tissue ground substance in the central nervous system (16), the perivascular location of these deposits becomes very significant. It tends to support the postulate (16) of a vascular rather than nervous tissue origin of the deposits. Chronic fatigue and anoxia produce an accumulation of mucopolysaccharide ground substance in interstitial tissue around capillaries separating the parenchyma from the source of nutrition and causing impaired nutrition and accumulation of excretory substances. These changes might appear first in such susceptible areas as the globus pallidus which is apparently highly sensitive to anoxia.

Correlation with a process, more specific than anoxia, is more difficult. Although there is a striking absence of the deposits in the infectious disease group, there is no general evident correlation of their occurrence with any particular type of disease. A definite increase in incidence of the deposits with increasing age is completely independent of the type of disease process present. It could be explained by more frequent exposure to short periods of anoxia occurring during a longer life time.

This incidence is increased with certain types of chronic cerebral lesions, however, there is no greater likelihood of their containing calcium. Arteriosclerosis could not be shown to belong to this group. Again, a correlation with local tissue anoxia around these chronic lesions suggests itself.

If the deposits are present, calcium metastases from destructive bone lesions increase the likelihood of their being calcified. However, they have no influence on the incidence of the deposits. Whether this is also true for hypo- and hyper-parathyroidism would be of great interest. It is also an interesting but unanswered question whether the large series of cases of vascular deposits reported with hypoparathyroidism (19) merely represents a striking calcification, or whether this metabolic disturbance influences the incidence of the deposits as well.

(Authors' Abstr.)

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Circulatory and Respiratory Changes Induced by Electrical Stimulation of Limbic System (Visceral Brain)

1. In 25 cats and 13 monkeys multilead electrodes were implanted on both sides in different parts of the limbic system of brain. After recovery these areas were stimulated electrically in normal animals, while their B.P. and respiration were recorded through carotid and tracheal cannulae.
2. Stimulation of the frontal lobe structures generally caused a rise in B.P. and of the temporal lobe structures generally a fall. Temporal polar stimulation gave a rise in B.P. in cat and a fall in monkey.
3. Both increase and decrease in heart rate were elicited by stimulation of all regions, and these changes had no relation to the rise or fall of B.P.
4. Respiration was also inhibited in the majority of temporal lobe stimulations and accelerated in the majority of frontal lobe stimulations, but opposite effects in some animals were also obtained.

(Authors' Abstr.)

Conditioned Reflexes Established to Electrical Stimulation of Cat Cerebral Cortex

A 2 sec. train of 50/sec., 2 msec. pulses delivered through bipolar electrodes permanently implanted with 1 mm. of the surface of the cerebral cortex served as a conditional stimulus for foreleg flexion, the conditioned reflex. At the marginal gyrus initial training of 18 cats to a criterion of 15 responses in 25 daily stimulations required 44-367 trials, which was equivalent to that needed for eight other animals conditioned to tonal or photic stimuli.

Of 85 cortical points assayed, 15 did not yield this criterion, but within the marginal, postlateral, middle suprasylvian and middle and posterior ectosylvian gyri no areas were found "silent" in this regard. It appears possible, however, that with further experience some portion of the middle suprasylvian area may be found more refractory to this procedure than other cortical regions.

Since it is possible to establish conditioned reflexes to electrical stimulation of the dura mater, with no outward evidence of pain and with the use of the same parameters as for the cortical conditioning, caution is necessary in interpreting a response as arising exclusively from direct excitation of cortical neurons. It is possible to circumvent this potential source of artifact since: (a) stimulation of extracortical elements can usually be detected by concomitant changes in skin resistance, (b) the meninges were found to become insensitive 3-5 mm. lateral to the midline, (c) bilateral trigeminal neurotomy effectively denervated the regions pertinent to this study. The latter procedure did not disturb responses conditioned to cortical stimulation. Removal of both cortex and meninges in the region of electrode implantation permanently abolishes the conditioned reflexes, thus excluding possible undetected artifacts in this procedure.

Proof of both the adequacy of controls and the reality of direct cortical conditioning makes possible a variety of neurophysiological experiments on the role of the cortical system in learned behavior.

(Authors' Abstr.)

Physiological Evidence of Localized Cerebellar Projections to Bulbar Reticular Formation

Physiological investigations on cerebello-reticular relationships were performed in decerebrate cats, using monopolar D.C. stimulation of the cerebellar surface and single unit recording from medial bulbar reticular units. The following results were obtained.

1. Cerebellar modulation of reticular spike discharges was elicited by stimulating the vermal surface of the anterior lobe (generally Larsell's lobules IV and V). Higher intensities were required for eliciting responses from the intermediate part and it is likely that these effects were due to physical or neural spread from the vermal cortex. Stimulation of Crus I was certainly ineffective.

2. Some of these reticular units were driven diffusely by stimulating the whole surface of the anterior vermis, whereas others appeared to be influenced by a single folium and even by the ipsilateral part of it, if threshold stimulations were used.

3. The strictly localized cerebello-reticular relationships were due to volleys arising in the area immediately underlying the "different" electrode, as shown by the decrease of threshold following localized strychninization and by the much higher intensities of current which were required after suction or cocaineization of the active area.

4. It is suggested that the diffuse vermal effects were obtained whenever the units acting upon the reticular formation were localized in the deep portions of the cerebellar folia.

5. The responses suggesting point-to-point cerebello-reticular relationships were often extremely resistant to barbiturates. Polarity, shape and voltage of the spikes were not modified by cerebellar polarization.

(Authors' Abstr.)

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An Experimental Study of Psychogalvanic Reflex Responses of Normal, Neurotic and Psychotic Subjects

It is a widely held hypothesis that neurotics are differentiated from normals by greater emotional lability and reactivity, and consequently by greater autonomic responsiveness. The author's data failed to support this hypothesis; the neurotic group is not differentiated in terms of responsiveness but rather in their slower rate of "calming down". Neurotics have high resistances initially, though not quite as high as psychotics. They can be further separated from the psychotic group by considering the trend of their scores during the first five minutes of a rest period, which indicates that they are much slower to show an increase in resistance over the initial basal score than are either psychotics or normals, whose recovery is of equal rapidity.

Psychotics, conversely, are often believed to be hypoactive emotionally and autonomic-ally, and this part of the author's hypothesis was borne out in so far as their response curves run at a higher level of resistance throughout the experiment. However, changes in resistance, consequent upon different stimuli, when calculated independently of basal scores, did not differentiate psychotics from normals or neurotics as might have been expected from this general hypothesis.

With respect to the units in which change scores can best be expressed, the author's findings did not accord with those of other investigators. It proved impossible to find change scores which (1) had low correlations with basal scores and also (2) produced significant differences between the three groups. Correlations between different change scores differed from group to group for any given stimulus and from stimulus to stimulus for any one group in a manner quite unpredictable and impossible to reduce to any consistent rule. It would seem that little progress is likely to be made in working with the P.G.R. until the theoretical issues raised by these findings can be resolved.

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Influence of Emotional Stress on the Renal Circulation

Cats reduced to a state of emotional stress after confrontation with a barking dog exhibit a profound alteration of the renal circulation. The cortex is more or less strongly anemized. This is evidenced on intravital injection of India ink either as an irregular mottling, or as a uniform absence of ink in the cortex, whereas the medulla is hyperemic or strongly ink injected. No diversion of the blood or India ink through the juxtamedullary glomeruli is noted. The tendency of the renal cortex to become anemized under psychogenic influence with the subsequent release of pressor agents ought to be regarded in a consideration of the pathogenesis of essential hypertension.

(Authors' Abstr.)

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